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CALL-infused project-based learning: a case study of adult ESL students learning prepositions

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CALL-infused project-based learning: A case study of adult ESL students learning prepositions

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DEDICATION

I would like to dedicate this thesis to my Lord Jesus, who gave me the dream to pursue a master's degree as well as the grace to achieve it.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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ABSTRACT

Project-based learning (PBL) with computers has become a topic of interest, and there has been a call for research to determine whether they facilitate learning and motivate students. This case study examines how English as a second language (ESL) adult learners' proficiency with prepositions was affected by project-based learning with enhanced input, explicit instruction, and production practice using the software program Hot Potatoes. The 14 participants were part of an intermediate ESL class offered by a Midwestern community college in the U.S. The students were divided into three different levels: low, intermediate, and high. The students then were divided into three main mixed-level groups, and each group was given a handout with a different set of grammatical rules. Each group was asked to create a 16-item multiple-choice quiz based on the rules in the handout. Following this, each group entered another group's 16 multiple-choice quiz into the software program, Hot Potatoes. In the final stage, each group took a Hot Potatoes quiz made by another group whose work they had not yet been exposed to. In addition, the students studied a list of 16 prepositions outside of class; the list was not part of the project. The students took a pre-, post-, and delayed posttest and were interviewed about their opinions about the project and the list.

The results of the one-way repeated measures analysis of variance (ANOVA) showed that there was a significant gain in pre-post test scores for the project. Although preferences and scores did not correlate, qualitative findings suggest that the intermediate and high-level students preferred the project, whereas the low-level students preferred the list. Ten students used strategies that were used during the project, such as forming rules for prepositions or

finding example sentences on the Internet, to help them study the list. Thus, the qualitative data suggested that students transferred the strategies to a new context. Eleven students stated they would like to do a similar project in the future.

CHAPTER 1. INTRODUCTION

1.1 Statement of the Problem

There have been many studies done on project-based learning (PBL) with mainstream students as well as language learners (e.g., Beckett & Slater, 2005; Boaler, 1998; Cognition and Technology Group at Vanderbilt, 1992b; Levis & Levis 2003; Wilhelm, 1999). These studies show PBL is effective and motivating if it is structured. In the field of second language acquisition (SLA), PBL studies (Beckett, 1999; Beckett & Slater, 2005; Eyring, 1989; Kobayashi, 2004; Levis & Levis, 2003) have focused mainly on meaning-based communication. With the exception of Thitivesa (2014), very few PBL studies used in language teaching have focused on grammar, and virtually no PBL studies used technology to focus on form. Therefore, a study that uses technology to focus on form in a PBL unit that is structured is needed. This chapter will address the theoretical framework that connects PBL with CALL, thus influencing and informing the current study, and chapter two will address the studies that have been done in these two areas.

1.2 Theories and Practices That Influenced the Project

1.2.1 Dewey's experiential learning theory

It is important to discuss Dewey and his experiential learning theory because PBL stems from this theory, and it is the basis for employing projects in the current study; that is, it is vital that students are provided with quality experiences so that they will be motivated to pursue future learning.

Dewey (1916) in his book, *Democracy and Education*, argued that people have to act upon their environment in order to grow intellectually, and that simply thinking about

something is not enough to acquire understanding. Along with this theory, Dewey developed a method for learning. The different parts of the method included a) finding an experience that is motivating to the learner b) identifying a problem c) seeking information that can help solve the problem d) planning a way to solve the problem and e) discovering if the plan works by carrying it out (Dewey, 1916, p. 192).

Later, Dewey discussed the importance of providing quality experiences in which students will be motivated to pursue learning not only in the present but in the future as well. Dewey (1938) supported the notion of student-centered learning; that is, he believed that teachers must take into account the students' needs, abilities, and interests when considering what kinds of educational experiences will be beneficial. He stated that true, quality experiences should cause students to pursue education and create a desire for future learning. Dewey spoke of the importance of creating interest in the learner when he wrote:

> What avail is it to win prescribed amounts of information about geography and history, to win ability to read and write, if in the process the individual loses his own soul: loses his appreciation of things worth while, of the values to which these things are relative; if he loses desire to apply what he has learned and, above all, loses the ability to extract meaning from his future experiences as they occur? (Dewey, 1938, p.49)

Dewey's student, Kilpatrick (1918), echoed Dewey's belief when he stated "we may therefore take as the criterion of the value of any activity – whether intentionally educative or not – its tendency directly or indirectly to lead the individual and others whom he touches on to other like fruitful activity" (p. 6). Using Dewey's ideas, Kilpatrick published the article, "The Project Method," (see Brubacher, 1947; Cremin, 1961) making this method famous (Holt, 1994) and defining what a project should entail – experiences that bring about "wholehearted purposeful activity" (Kilpatrick, 1918, p. 10). Discussing Kilpatrick is important because his article popularized PBL, and he stipulated that projects ought to bring

about interest to such a degree as to encourage future learning. Therefore, for the current study, the students' interest in grammar particularly prepositions was taken into account.

1.2.2 Sociocultural theory and scaffolding

Sociocultural theory and scaffolding were included in the current study because they support the notion that someone more skilled is necessary to come alongside students to help them learn prepositions; that is, the teacher needs to help students understand the target form by providing materials and being available to answer questions rather than having the students rely on themselves. These theories were the basis for creating step-by-step directions for the quiz-making software Hot Potatoes, providing handouts with the "rules" for prepositions, and having the teacher available to answer questions in the current study.

Driver, Squires, Rushworth, and Wood-Robinson (1994) in their book explained the need for a teacher to provide support when they wrote: "Experience by itself is not enough. It is the sense that students make of it that matters" (p.7). Indeed, if the students' learning project is not structured so that support by the teacher is provided, students may not understand or learn the material. Driver, Squires, Rushworth, and Wood-Robinson (1994) further explained that "negotiation with an authority" is needed in hands-on science (p. 8). This could also be said for any type of experiential learning. This belief that an expert is needed resonates with the idea of scaffolding, which is part of Vygotsky's sociocultural theory and is associated with the zone of proximal development. Ellis (2003) defines the zone of proximal development as a "term used in sociocultural theory to explain how participants in a task interact in order to enable learners to perform functions that they would be incapable of performing independently" (p. 353).

According to Ellis (2008b), Vygotsky's sociocultural theory is a part of second language acquisition, and this theory holds that it is through social interaction that learners can improve their language. Ellis (2008b) states "Learners progress from object-and other-regulation to self-regulation through interacting with others" (p. 979).

Scaffolding in educational psychology, according to De Guerrero and Villamil (2000), refers "to the process by which tutors – parents, caretakers, teachers, or more expert partners – help someone less skilled solve a problem" (p. 52). In his book, McKenzie (2000) explained eight features of educational scaffolding: a) step-by-step instructions b) reasons for doing the project c) structure so that students do not get off the path d) assessment to help students know what is expected e) good sources provided f) structure so that surprises are kept to a minimum g) a sense of accomplishment after a small amount of time h) motivation to pursue learning.

1.2.3 Learning strategies and transfer

Oxford (1990) defined learning strategies as "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferrable to new situations" (p. 8). Learning strategies are important to this study because one of the research questions has to do with finding out what strategies the students used to study the list of prepositions and whether transfer of learning strategies occurred.

Ozeki (2000) conducted a study on listening strategies with female adult English-as-a Foreign-Language (EFL) students in Japan. The researcher found that the high-level students used more strategies as well as strategies that were more cognitively demanding than the low-level students. In addition, after teaching the students new strategies, the treatment group performed better on the listening comprehension test than the control group. The treatment

group also transferred the strategies to other classes (both in their native language and in English). The students also reported seeing the benefits of learning strategies and continued to use these strategies after the instruction period was over. Ozeki's study is relevant to the current study because it shows that when students were taught strategies, they performed better on a listening test and transferred the strategies to other classes. Although the current study did involve the researcher teaching strategies explicitly, the researcher used strategies such as boldfacing and underlining and grouping the prepositions according to "rules" to help the students understand how to use prepositions. In addition, the researcher had the students create sentences with prepositions during the project. One of the goals of the current study was to explore whether the students would learn after using the strategies given to them as well find out if they would transfer the strategies used in the project to another context (studying the list of prepositions).

In another study, Nakatani (2005) compared the effects of teaching oral communication strategies to female adult EFL learners in Japan with a control group. This experimental group was taught how to ask for help, how to check for understanding, and how to paraphrase. The results showed that the experimental group performed better on the posttest than the control group on the oral skills test. Similar to the study mentioned above, Nakatani's study shows that when students are taught strategies, they perform better than the control group.

The next study is important because it discusses how high-level students did not use as many strategies as low-level learners because the former may not have needed as many strategies due to their higher proficiency. This difference in use of strategies is of interest because in the current study, the students were divided into different levels, and one of the

aims of this study was to explore how the intermediate and high-level students differed in their use of strategies from the low-level students. In their study, Oxford, Cho, Leung, and Kim (2004) divided 36 ESL college students into two reading proficiency groups: low and high. Both groups read an easy passage and a difficult one. The results showed that for the easy passage, the low and high groups were similar in their use of strategies. For the difficult passage, the low-level group differed from the high group in that the former used more strategies. The researchers believed that the high-level students did not use a lot of strategies because they were more proficient readers and thus did not need to rely on as many strategies as the low-level students. In addition, the results showed that the low-level students tended to use strategies that were more basic such as reading the text out loud. The high-level students, on the other hand, used more complex strategies such as finding the main idea or figuring out the meaning from the context.

1.2.3.1 Transfer of Strategies

The following discussion of transfer of strategies is crucial to the current study because it describes the conditions that are necessary for transfer to occur. One of the research questions has to do with whether students transfer strategies from the project to another context. Bransford, Brown, and Cocking (2000) asserted that certain conditions need to be met for transfer to be able to occur. In their book, the authors explained that the students need to learn the topic well in the original context before transfer can occur. In addition, students need to have motivation to pursue learning; this, according to the authors, can be done by having the students make something or by sharing what they have learned with others. Bransford, Brown, and Cocking also stressed the importance for students to have understanding about the subject matter rather than just memorizing information.

Bransford, Brown, and Cocking (2000) described a 1908 study which demonstrated a concept that is not new: the notion that understanding is important. The children were divided into two groups; one group was given an explanation of how refraction of light works, and the other group did not get the explanation. Both groups used darts and aimed at a target which was 12 inches below the surface of water; the two groups were similar in their performance. However, when the target was just four inches below the surface of water, the group that got the explanation did better. Thus, the group that attained understanding was able to transfer what they learned to a new context.

1.2.4 Noticing and language learning

Noticing in language learning is important to the current study because this theory argues that when students notice the input, short-term learning occurs. In addition, studies (DeRidder, 2002; Izumi, 2002; Khatib & Safari, 2013; Lee, 2007; Leeman, Arteagoitia, Fridman, & Doughty, 1995) have shown that when enhanced input (e.g., bold-facing, underlining, or highlighting words) is combined with other learning strategies, students become more proficient in the target form. Therefore, enhanced input in the form of bold-facing, capitalizing, and underlining was used for the handouts with the "rules" for prepositions in combination with explicit instruction to facilitate the learning of prepositions in the current study.

In his paper, Schmidt (1995) explained that the "noticing hypothesis states that what learners notice in input is what becomes intake for learning" (p. 20). However, Ellis (2001), qualified what Schmidt said by stating: "noticing enables learners to process forms in short-term memory but does not guarantee they will be incorporated into their developing interlanguage" (p. 8).

Concerning SLA studies that involved enhanced input and noticing, Izumi (2002) supports combining textual enhancement with other learning strategies to promote learning of the targeted form. Izumi found that textual enhancement alone was not enough for substantial learning to occur for English relative clauses; however, output plus textual enhancement did result in learning. Several other studies (DeRidder, 2002; Khatib and Safari, 2013; Lee, 2007; Leeman, Arteagoitia, Fridman, and Doughty, 1995) showed that enhanced input combined with explanations or other strategies for learning resulted in more accuracy with the target form.

Khatib and Safari (2013) investigated whether EFL university students in Iran were able to learn politeness strategies through the use of enhanced input. There were two groups: one group had bold-faced font in their text and another group had regular font in their text. Both groups read and followed along (conversations with the target form) while they listened to an audio recording of the conversations. Thus, enhanced input was used in combination with reading and listening. The results showed that the enhanced group grew in their knowledge of politeness strategies and was able to use this target form more proficiently than the control group.

Leeman, Arteagoitia, Fridman, and Doughty (1995) found that the university students who received enhanced input (highlighting and underlining) along with corrective feedback improved in their proficiency in their use of the preterit and imperfect verb forms in Spanish.

DeRidder (as cited in Chapelle, 2003) studied the effects of enhanced input in CALL; DeRidder (as cited in Chapelle, 2003) gave the participants four kinds of text: “one with the glossed words highlighted, one with glossed words and no highlighting, one with highlighted words without glosses, and the other with no highlighting or glosses” (p. 42).

This study showed that highlighting needed to accompany glossing for vocabulary to be learned.

Lee (2007) examined the effect that enhanced input and familiar reading topics had on the acquisition of the passive form and reading comprehension. Lee chose to use bigger, bold-faced type in a different typeface to emphasize the target form: passive voice. The 259 Korean 11th graders who were studying English were divided into four groups: a) no enhanced input with a familiar topic, b) no enhanced input with no familiar topic, c) enhanced input with a familiar topic, and d) enhanced input with no familiar topic. The students were tested over how much they improved in regards to the passive form and reading comprehension. The results showed that enhanced input helped the students learn the passive form while familiar topics facilitated gains in students' reading comprehension scores. It is important to note that prior to this study the students had been taught rules for the passive form repeatedly and explicitly. Thus, the gains in the target form seemed to have been affected by enhanced input coupled with prior explanations. This demonstrates that explicit instruction combined with enhanced input is effective in helping students learn the passive form.

One study that did not include explicit instruction (Trahey and White, 1993) found that input flooding (i.e., making the target form salient by increasing its frequency) resulted in ESL students (French speakers) learning the order subject, adverb, verb but not being able to figure out that they were not supposed to place the adverb between the verb and the object.

1.2.5 Explicit and implicit learning

Reviewing work on explicit learning is critical because studies in the field of second language acquisition (Alanen, 1995; Fordyce, 2014; Norris & Ortega, 2000) have shown it is

more effective than implicit learning. Because explicit learning has been shown to be effective, "rules" for prepositions were given to the students on the handouts in the current study.

Explicit learning is defined by Ellis (2008b) as

> a conscious process and is also likely to be intentional. It can be investigated by giving learners an explicit rule and asking them to apply it to data or by inviting them to try to discover an explicit rule from an array of data provided. (p. 962)

Implicit learning, according to the same author, is

> learning that takes place without either intentionality or awareness. It can be investigated by exposing learners to input data, which they are asked to process for meaning, and then investigating (without warning) whether they have acquired any L2 linguistic properties as a result of the exposure. (p. 965)

In the field of cognitive psychology, Reber (1967) found that the participants who had memorized various sequences of letters that contained an underlying rule were able to determine if new strings of letters were grammatically correct; the participants memorized the sequences without noticing that there was a system within the letters according to Reber. Reber concluded that the results of this study showed that implicit learning leads to learning.

However, later Reber and his colleagues conducted additional studies, one of which was Reber, Kassin, Lewis and Cantor (1980). Reber et al. (1980) conducted a study comparing three experimental groups: a) exposure to 21 rule-governed strings of letters three times followed by explicit instruction b) explicit instruction followed by exposure to 21 rule-governed strings of letters three times c) exposure to 21 rule-governed strings of letters twice followed by explicit instruction then exposure to the same 21 rule-governed strings of letters. The authors found that the group that received explicit instruction at the beginning (instead of in the middle or at the end), followed by exposure to the 21 rule-governed strings of letters three times, did the best.

Reber (1989) explained that the reason why the participants who received explicit instruction at the beginning of this study performed better than the other groups was because of salience: If the grammar rule is salient, explicit instruction will work. However, Reber (1989) asserted that if the grammar rule is complicated to attain, implicit learning would facilitate learning better than explicit learning.

Robinson (1995) found that in his study that a large number of participants who were instructed to focus on meaning (the incidental group) or memorize the information (the implicit group), were in fact "looking for rules, casting doubt on the claim that learning under these conditions proceeds nonconsciously" (p. 336). In addition, Robinson's study did not corroborate Reber's theory that implicit learning is better than explicit learning in relation to learning complicated grammar rules.

Likewise, in the field of SLA, there are some who believe in implicit learning. For example, Krashen (1982) was opposed to the idea of explicit learning. Krashen believed that adults learn implicitly as children do and argued that comprehensible input is what is needed for adults to become more proficient in a language.

Although Krashen and others in cognitive psychology support the notion of implicit learning, the current study was undertaken with the belief that explicit learning is more effective in helping student become more proficient in their use of the target language. Evidence for this thinking has stemmed from the following studies.

Norris and Ortega (2000) conducted a meta-analysis in order to examine 49 studies; the studies were quasi-experimental or experimental and were published between 1980 and 1998. All were required to have a treatment, a specific rule-driven target form, and a dependent variable(s) that assessed how much the participants learned the targeted form due

to the independent variables. The target languages included English, Spanish, Japanese, and French. The results suggested that explicit learning was distinctly better than implicit learning.

As far as individual studies, Fordyce (2014) researched the effectiveness of explicit learning plus "bold type, underlining, and a larger font" (p. 16) versus implicit learning for the target form epistemic stance with EFL university students in Japan who wrote test essays; the explicit group outperformed the implicit group on both the immediate posttest and delayed posttest (five months later).

In another study, Alanen (1995) found that the university students in Hawaii who received a clear explanation of the rules for the Finnish locative suffixes and consonant gradation performed better than the other two groups that did not receive explanations of the rules.

With the exception of Fordyce's (2014) study, the studies above involved controlled production tests. Pertaining to free production tests, Ellis (2008a) suggested employing explicit instruction coupled with production practice in order to increase students' proficiency on these kinds of tests.

1.2.6 Explicit learning with production practice

The following studies (Felix-Brasdefer, 2008; Lyster, 1994) are important to discuss because they demonstrate that when explicit instruction is combined with production practice, higher proficiency of the target form can be attained by language learners in free production tests. Therefore, in the current study, the students were asked to use the "rules" for prepositions on the handouts to create 16 multiple-choice items.

According to Swain (2000), production practice is important because it "pushes learners to process language more deeply – with more mental effort – than does input. With output, the learner is in control. In speaking or writing, learners can 'stretch' their interlanguage to meet communication goals" (p. 99).

Felix-Brasdefer (2008) studied the effects of explicit instruction with production practice for pragmatics with university students studying Spanish as a foreign language. The author found that the group that received explicit teaching and oral production practice was more proficient at using mitigators on the posttest and delayed posttest than the control group. Role-plays were used to test the students in this study.

Lyster (1994) investigated the effectiveness of functional-analytic instruction (explicit instruction + production practice) with 106 eighth grade students who studied the use of the French word vous. The results showed that the three groups that received the treatment significantly outperformed the two control groups on all three tests: multiple-choice, written production test, and oral production test. The gains made by the experimental groups were durable.

1.3 Thesis Goals

My goal in conducting this study on PBL that focused on grammar was to teach prepositions through a computer-assisted language learning (CALL) project. In particular, I conducted a case study that involved a CALL project on prepositions, which used enhanced input, explicit instruction, and production practice with the program Hot Potatoes. The main purpose of conducting this thesis was to examine the effectiveness of this kind of PBL as well as to explore the students' opinions on what the strengths and weaknesses of the project were.

1.4 English Prepositions

I chose English prepositions as my grammar point because they can be difficult to acquire for second language learners (Koosha & Jafarpour, 2006). Indeed, there can be confusion about which one to use when there seems to be conflicting patterns such as "*in bed but on the couch*" (Koosha & Jafarpour, 2006, p. 193). As a teacher, I have observed that my intermediate-level students were able to attain a certain degree of fluency and accuracy in English; however, these students seemed to have trouble with target forms such as prepositions, which do not seem to have clear "rules" to follow. In addition, my adult ESL students whom I tutored would often ask me to teach them prepositions and showed a desire to understand how to use them. Thus, I saw a need for students to learn how to use prepositions and sensed the students' interest in studying them. After doing much reading, I discovered that there are certain patterns for prepositions; therefore, I wanted to use these "rules" to equip students so that they could have a better understanding of how to learn prepositions. It was my hope that by helping students learn prepositions, they could attain a higher level of proficiency in English.

1.5 Computer-Assisted Language Learning With Project-Based Learning

I used CALL because I wanted to motivate my students by having them create multiple-choice quizzes using the software Hot Potatoes. According to Bransford, Brown, and Cocking (2000), creating something (a quiz) and sharing the product with other students is motivating. Because the students were accustomed to using computers for a variety of activities, the mechanics of entering and later taking the quiz via computer was familiar and non-threatening to most of them. I used Hot Potatoes because it allows students to input multiple-choice quizzes, take another group's quiz, and receive instant feedback on their

answers. In this way, they could correct their answers immediately. Research has shown that CALL can motivate students to learn (Ibabe & Jauregizar, 2010; Ngu & Rethinasamy, 2006; Rico García & Vinagre Arias, 2000; Tsou, Wang, & Li, 2002). In addition to motivating students by using CALL, I wanted to teach the students how to use the quiz-making software Hot Potatoes incidentally (for information on incidental learning, see Kerka 2000) to help the students develop their computer skills.

1.6 Computer-Assisted Language Learning Projects With Textual Enhancement, Explicit Instruction, and Production Practice

In addition to using CALL for the projects, I also chose to use enhanced input along with explicit instruction and production practice in the hopes that this would help students learn prepositions more readily. I used textual enhancement by bolding and capitalizing the prepositions and underlining the words that collocated with these prepositions on the handouts (Appendix A) that I gave my students because when textual enhancement is combined with other learning strategies, it has been shown to be effective (DeRidder, 2002; Izumi 2002; Khatib and Safari, 2013; Lee, 2007; Leeman, Arteagoitia, Fridman, and Doughty, 1995). I also used explicit instruction by giving the students "rules" for prepositions on the handouts because several studies (Alanen, 1995; Fordyce, 2014; Norris & Ortega, 2000) found that explicit instruction was more effective than implicit learning (i.e., learning without purposing to learn). Finally, I combined explicit learning with production practice by having my students create multiple-choice items using the "rules" for prepositions because explicit instruction coupled with production practice can lead to higher proficiency of the target form on free production tests (Felix-Brasdefer, 2008; Lyster, 1994).

1.7 Significance of the Study

My study advances research in language teaching in two aspects. First, my study proposes an innovative method of teaching grammar through using technology-infused PBL. Second, the effectiveness of this new approach is empirically evaluated and the results add to the dearth of knowledge about this method of teaching grammar.

1.8 Definition of Tasks and Project-Based Learning

PBL has five components according to Thomas (2000), which are: "centrality, driving question, constructive investigation, autonomy, and realism" (p. 3). Pertaining to centrality, Thomas (2000) explained that projects should be the main part of the curriculum, not something extra added on. Thomas (2000) also clarified that in the constructive investigation component of PBL, students need to develop new skills or knowledge.

While there are few or no conferences on PBL, there are conferences on task-based language teaching. In defining tasks, Chapelle (2003) explained:

> What qualifies as a 'task' differs from one researcher to another, but across definitions it is generally agreed that tasks must have goals, and that they are carried out through participants' engagement in goal-oriented behavior that relies at least in part on language (p. 129).

Projects tend to be bigger in scope than tasks. For the purposes of this current study, PBL is defined as a group of related tasks that achieve a goal (e.g., creating a quiz). Therefore, my study is a small project that consists of three tasks: 1) creating a multiple-choice quiz, 2) entering another group's multiple-choice quiz into a computer program (Hot Potatoes), and 3) taking a third group's quiz.

1.9 Overview of the Thesis

This thesis will include a literature review on PBL with mainstream students, PBL with language learners, and technology in Chapter 2. The methodology and procedures will

be discussed in Chapter 3. In Chapter 4, a discussion of the findings of my study will be reported. Chapter 5 will include the results of my study as well as the conclusions and limitations. Chapter 5 will also discuss the implications for future research and instruction.

CHAPTER 2. LITERATURE REVIEW

2.1 Chapter Overview

The first chapter introduced and defined the concept of project-based learning and teaching and presented the motivation and background information for this study. As this study examines the use of technology-infused projects and students' perceptions and learning gains from this type of PBL, it is critical to examine previous research to provide a clear background of PBL use, especially in language education. This chapter will thus review the research that has shown the benefits and drawbacks of project-based learning and teaching, both with mainstream students and with language learners. It will talk about technology as a motivating factor and address the dearth of studies using PBL that focuses on form. Finally, this chapter will conclude by summarizing the key findings and stating the research questions that have developed from these studies.

2.2 Effectiveness of Structured Project-Based Learning

PBL studies with mainstream students (Boaler, 1998; Cognition and Technology Group at Vanderbilt 1992b; Mergendoller, Maxwell, and Bellisimo, 2006) have been shown to be effective when it is structured and teachers provide the problem that needs to be solved as well as guide the students to help them solve the problem. Therefore, structure is necessary when using PBL with students in order for students to learn the material.

2.2.1 Project-based learning with mainstream students

PBL, according to Boaler (1998), has been shown to be effective in helping students apply their math skills to solve real-world problems. In her 1998 study, Boaler compared the learning methods of two schools in Great Britain for three years, conducting "a longitudinal

cohort analysis of a ‘year group’ of students in each school, while they moved from Year 9 (age 13) to Year 11 (age 16)” (n = 300) (p. 43). In the traditional school (Amber Hill), the teacher directed the class, and the students used textbooks to learn math; in the project-based school (Phoenix Park), the setting was more relaxed with the students doing projects and working in groups.

An example of a problem that the students were given to solve was: “The volume of a shape is 216, what can it be?” (Boaler, 1998, p. 49). Although it was up to the students to figure out the answers to the problems, the teacher would step in and teach the students the math skills when necessary. Thus, the PBL was somewhat structured in that the students were provided the questions or problems that needed to be solved and support (at times) was given by the teachers through direct instruction.

The results of the qualitative part of the study showed that the Amber Hill students expressed disapproval of the traditional instruction whereas most of the Phoenix Park students enjoyed PBL. This demonstrates that students favored structured PBL over traditional instruction. Therefore, structured PBL is needed in order to motivate students to learn.

With regards to the quantitative data, when the students were in Year 9, they were given two tests, one in which they were required to apply certain mathematic skills to solve authentic problems and one which tested content knowledge, such as finding the volume of a cuboid. The PBL group performed better on the problem-based test but scored the same as the traditional group on the test that assessed math knowledge; thus, the traditional group was found to have the math skills necessary to solve the problems, but they were unable to apply these skills to complete the tasks. In addition, all students took the General Certificate of

Secondary Education (GCSE) exam, which is a national math test that assesses mostly "content knowledge, apart from a few questions that are more applied" (Boaler, 1998, p. 55). Again, the PBL group performed better in that more students from Phoenix Hill passed this test. This was interesting because the GCSE test assessed the students' content knowledge rather than their ability to solve real-world problems, which the Phoenix Park students were used to doing through projects, yet these PBL students were able to do better on the exam. This study demonstrates the effectiveness and necessity of using structured PBL with mainstream students; that is, when students are provided the problems that need to be solved and support through direct instruction, students improve in their proficiency with math.

In another study that involved math, The Cognition and Technology Group at Vanderbilt (1992b) reported that students who participated in the Jasper project, instruction similar to PBL, improved in the areas of word problems, planning problems, and attitudes toward math. This research group compared 10 Jasper classrooms with 10 control classrooms. The participants were 739 fifth and sixth graders and the study lasted about three weeks. The teaching strategies used in the Jasper study were discussed in a separate article, "The Jasper Experiment: An Exploration of Issues in Learning and Instructional Design" (Cognition and Technology Group at Vanderbilt, 1992a).

Students in the Jasper classrooms watched three or four adventure videos (each 15 to 20 minutes long); these videos contained a problem for the students to solve as well as presented all of the information needed to solve the problem (Cognition and Technology Group at Vanderbilt, 1992b). Two videos had to do with planning a trip and the other two videos involved the students forming a business plan.

The instructors in the Jasper classrooms provided support by asking questions and leading discussions to help students solve the problems (Cognition and Technology Group at Vanderbilt, 1992a). For example, in order to help students understand there were other possible solutions, the teachers asked, "are there any other ways of rescuing the eagle that we might think about?" (Cognition and Technology Group at Vanderbilt, 1992a, p. 71) Therefore, the Jasper group was given some structure through support from the teacher as well as information embedded in the videos; the students were not left on their own to figure out the answer. This support that was given is important because structure seems to be necessary in order for the students to learn the material.

The results of the study showed that although the control group and the Jasper group "improved at the same rate" on math concepts, the Jasper group outperformed the control group on word problems, planning problems, and attitudes toward math (Cognition and Technology Group at Vanderbilt, 1992b, p. 303). In addition, the results of the qualitative data comparing the two groups revealed that the Jasper students were less fearful of math, more prone to see the applicability of math in the real world, and more likely to view challenges favorably (Cognition and Technology Group at Vanderbilt, 1992b). This study shows that structured PBL is both effective at teaching math as well as motivating students to learn and be challenged.

According to Mergendoller, Maxwell, and Bellisimo (2006), problem-based instruction (an approach similar to PBL) was also found to be effective in the subject area of economics. Mergendoller, Maxwell, and Bellisimo examined the effectiveness of problem-based instruction as compared to traditional instruction in four high schools for two weeks. Five teachers, each teaching macroeconomics to one or more problem-based classes as well

as one traditional class, were all experienced teachers who had been given training on the problem-based approach. Data were collected from 246 twelfth-grade students.

In this problem-based approach, "the teacher takes a facilitative role, answering questions, moving groups along, monitoring positive and negative behavior, and watching for opportunities to direct students to specific resources or to provide clarifying explanations" (Mergendoller, Maxwell, & Bellisimo, 2006, p. 50). In addition, the students were given a problem to solve rather than required to think of one on their own. Thus, this problem-based approach was structured in that a problem was given to the students and support was provided to the students through direct instruction (as needed), so that the students were not left to figure things out completely by themselves. Support is important because it provides the students structure so that they can learn the subject rather than having to teach themselves the material. The results of the study showed that the problem-based group outperformed the traditional group on the pretest-posttest ($p = .05$), which assessed students' knowledge of key ideas in macroeconomics (Mergendoller, Maxwell, & Bellisimo, 2006 p. 59). The findings from this study demonstrate that structured PBL is more effective than traditional instruction and therefore the former is needed for students to learn the material.

2.2.2 Project-based learning with language learners

The following studies are reviewed to demonstrate that when PBL with language learners is not structured, students did not learn and enjoy doing projects. On the other hand, when PBL is structured, students learn the material and are motivated to do projects. Therefore, structure in the form of providing the problem that needs to be solved and support from the teacher through guidance is needed for students to succeed as language learners.

Eyring (1989) studied how PBL in the area of ESL affected students' attitudes and proficiencies. The study was conducted at the University of California at Los Angeles. There were three groups of students: one group that did projects and two control groups. The group that used PBL was composed of 11 students; six of the students were Asian (Middle Eastern and Far Eastern) while the rest were from Europe and Latin America. The project involved having the students collaborate and conduct research in order to create a guide to Los Angeles for international students. When comparing the control groups with the PBL group, Eyring (1989) reported:

> there were no significant differences in most areas: listening comprehension, reading comprehension, error detection, verb forms and composition. However, the control group did score significantly higher on the multiple choice vocabulary in context test ($t = -2.28$, df 9, $p < .048$). (p. 184)

In addition, there was no significant difference in performance on the language learning strategies test between the control groups and the PBL group.

Concerning the students' attitudes, some of the participants did not like collaborating with their fellow classmates and expressed criticism toward the project because they did not feel that they were learning enough grammar. The teacher, a graduate student, found that the class had trouble agreeing on a topic that they all thought was valuable. Eyring (1989) stated, "In sum, in [the] orientation stage, the teacher encouraged students to rely on other students and on themselves for generating ideas for a project and identifying possible methods to research a group-selected topic" (p. 93). Thus, the teacher did not provide much structure to this PBL activity. This lack of support and structure is important because it shows that students are not able to learn on their own and therefore structure is needed.

Similarly, Prabhu (1987) investigated students' evaluations of task-based learning by collecting students' reactions toward this type of learning in India. Prabhu studied 390 ESL

students who were between the ages of eight and thirteen and were from eight Indian schools. The results showed that the students did not like communicative tasks such as story completion or role-playing because they were not structured and "the teacher's own sense of uncertainty about classroom procedures was not reassuring to them" (Prabhu, 1987, p. 23). This feeling of uncertainty and lack of structure resulted in the students' negative opinion about the projects. In order for students to be motivated to learn, structure and planning is required.

Later, however, the teacher was able to break down these tasks into smaller steps so that the students felt a sense of accomplishment and purpose. Prabhu also mentioned that the students did not like group work. This was due to the students feeling that they were losing the respect of their peers while working together.

In another PBL study, Kobayashi (2004) followed students from August 2000 to June 2001 as they worked together outside of class as well as during class in preparation to give oral presentations. The participants were 80 Japanese college students (11 key participants) who were studying ESL at a university in Western Canada. Kobayashi found some students provided structure for their groups in that they organized themselves in terms of preparation time and their method of practicing their presentations, whereas some groups did not. The groups of students who provided structure performed better than those who worked in unstructured groups. This demonstrates that when students provide structure for their groups, they improve more than students who do not provide structure for their groups; therefore, structure is necessary in PBL.

Two other studies (Levis and Levis, 2003; Wilhelm, 1999) that were structured showed that for the most part, they were well accepted by the students. Therefore, in order

for students to have a positive learning experience, as these studies showed, it is important for the teacher to provide support by providing materials or giving step-by-step instructions. Levis and Levis (2003) conducted a study that involved an ESL project-based writing class (taught about 25 times) at two colleges. The participants were international graduate students who were mostly from the science and engineering departments. For the project, the students wrote research reports but were given the topic as well as several articles from which they wrote their literature review. As far as support from the teacher, the instructor gave help as was needed. The results showed that students gave positive feedback, and they stated "that the course met their professional needs" (Levis and Levis, 2003, p. 219).

Wilhelm (1999) conducted a four-year study with ESL students who were studying in an intensive English program at a university; the students worked on different projects such as, "Know Your City, Travel U.S.A., and The Midwest Yesterday and Today" (p. 14). The teachers, according to Wilhelm gave the students more support at the beginning and then the students gradually took over control. Elaborating on the kind of support the students preferred, Wilhelm (1999) wrote: the students did not like having to learn on their own; they preferred "step-by-step guidance" (p. 16) and examples of what they were required to create as well as support from the teacher. Most of the students enjoyed doing the projects and wanted to share the products they had created with their families.

Beckett (1999) conducted a study in Canada involving 73 participants from China, Taiwan, and Hong Kong who were in grades 8-12. For one of the projects, the students did research on the topic of child abuse. The students also conducted research on different English words and then reported on their projects by writing a paper. The teachers' goals were:

> to foster life-long learning by language socialization of ESL students into Canadian school and social cultures; to challenge students' creativity and resourcefulness; to foster independence; to teach decision-making, critical thinking, and cooperative learning skills; to teach students how to learn; and to teach language in context. (p. Beckett, 1999, p. 100)

The results showed that only 18% of the students enjoyed PBL in her study (Beckett, 1999, p. 207). The rest of the students reported that they did not enjoy PBL or had both positive and negative feelings. When interviewed, students reported that they did not like PBL because they did not learn enough grammar and vocabulary. In addition, more than half of the participants "seemed to be frustrated with the student-centered and apparently unstructured nature of project-based instruction" (Beckett, 1999, p. 139). This lack of structure showed that when PBL is not accompanied with support, students get frustrated. Therefore, to encourage students and motivate them to learn, structure is crucial in PBL. In contrast to the students' opinions, the teachers' had a favorable view of project-based instruction. The students, according to the teachers, were able to accomplish the objectives for the project. This study suggests that PBL that highlights grammar and vocabulary may meet the desires of the students.

In response to the different goals that the teachers and students had, Beckett (1999) suggested that a framework could help students see how language and content can be learned at the same time. From this suggestion, Beckett and Slater (2005) developed the Project Framework to provide the structure needed in order for students to get the connection between learning a language and learning content.

Beckett and Slater (2005) reported on the use of the Project Framework (graphics and diaries) to help 57 undergraduate students at a Canadian University organize the knowledge they were constructing as well as plan and conduct their projects. The instructor's objective

was to teach the students English as they learned the content. The students worked in groups and were given the graphic and diary to help them plan their projects as well as a completed project to serve as a model. The teacher guided the students as they worked with the Project Framework and gave students support throughout the creation of their projects by providing feedback. The results showed that when the students used the Project Framework, 79% of the students reported that they were learning English, content knowledge, and critical thinking skills all at the same time while doing their projects (Beckett and Slater, 2005, p. 114). One student explained that she "could study not only English, but also other subject. In other words, I could kill two birds with one stone. I understand that there is a connection between the two" (Beckett and Slater, 2005, p. 114). Thus, this project-based instruction was structured in that the students used graphics and diaries and the teacher was present to give guidance as needed. PBL, therefore, seems to be effective when it is structured and teachers give feedback and a framework to help students set goals and organize their knowledge.

These studies support some of the benefits and challenges that are part of project-based instruction. The advantages based on Stoller (2006) are that students work on projects that are related to the real world, find project work interesting, improve their use of language, learn how to work with others, acquire knowledge about different subjects, develop trust in their ability to do well, become self-learners, and develop critical thinking skills.

On the other hand, some of the challenges that Frank and Barzilai (2004) listed include

> teachers' content knowledge, students' lack of experience in this new approach and their preference for traditional-structured approach; their preference for learning environment which require less effort on their part; and problems arising from time stress. Students struggling with ambiguity, complexity, and unpredictability and are liable to sense frustration in an environment of uncertainty, where they have no notion of how to begin or in which manner to proceed. (p. 43)

Therefore, based on the studies above and the challenges that students face, PBL seems to be more effective when it is structured and the teacher provides clear directions and guidance. It may be even more effective for some groups if PBL were designed to focus on form.

2.3 Paucity of Form-Focused Project-Based Learning Studies

Although a lot of studies show that PBL is effective and motivating if it is structured, there have been very few studies that teach form using PBL. In addition, there are virtually no studies that use technology to focus on form in PBL. The one study that uses PBL and focuses on form is Thitivesa (2014). The author in this study used a semi-structured project to teach 38 low-intermediate EFL college students writing skills. The specific writing skills included: "mechanics, usage, and sentence formation" (Thitivesa, 2014). The students worked on their projects for two months with the teacher giving corrective feedback and the students making revisions. The projects were somewhat structured in that examples were given to the students, as well as teacher guidance, throughout the project. This structure was important because PBL is more effective when teachers provide clear directions and guidance. The results of the descriptive statistics showed that the students improved more in the areas of mechanics and usage and less in sentence formation. Thitivesa pointed out that one reason why the students might have performed better on mechanics and usage is because these areas of writing tend to follow rules whereas sentence formation does not.

2.4 Vocabulary/Prepositions

There has been a lot of research done on the intentional teaching of vocabulary (e.g., Folse, 2004; Nation, 2001). However, a full literature review of intentional vocabulary teaching is beyond the scope of this paper. In its meaning-based nature, vocabulary learning in PBL tends to be more incidental (i.e. unintentional learning) than intentional (i.e., it's one

small aspect of the overall project). Little research, if any, has focused on intentional vocabulary teaching within PBL where vocabulary is the goal of the project.

2.5 Technology

It is critical to discuss studies on technology because it has been suggested that students are more motivated when using this (Ibabe & Jauregizar, 2010; Ngu & Rethinsasamy, 2006) and it facilitates the learning of the materials (Koosha & Jafarpour, 2006; Rico García & Vinagre Arias, 2000; Tsou, Wang, & Li, 2002). Therefore, technology has been used along with PBL in the current study. The studies that have been reviewed below used technology but were not PBL studies; they were included because they show how technology can facilitate learning and motivate students to learn.

One of these studies was Tsou, Wang, and Li's (2002) study. These authors found that when EFL sixth graders were divided into a computer-aided learning group and a traditional group to learn 13 abstract words, the computer-aided learning group did better. This shows that computer-aided instruction facilitates learning more than traditional instruction. For the computer-aided learning group, multimedia, non-linear web pages, and opportunities to email other students were given to provide support to the students in order to help them learn abstract words. In addition, a teacher was available for questions. For the traditional group, the same teacher taught the class using the same content as the computer-aided learning group. The researchers reported that most of the students liked the computer-aided learning and expressed a desire to use this method to learn in the future. Therefore, computer-aided learning has been shown not only to facilitate learning but also to be motivating as well.

In another study involving technology, Ibabe and Jauregizar (2010) used the software Hot Potatoes to teach statistics to 116 students who were studying in Spain. The researchers noted that Hot Potatoes was particularly helpful because it provided immediate feedback to students, allowing them to know if their answers were correct or incorrect. The researchers also pointed out that no grade was given for using the software to ensure that the students would be motivated for the sake of learning rather than earning a grade. The results showed that the students enjoyed using Hot Potatoes. The use of the software was shown to be motivating in this study and, thus, it was of interest because it is used in the current study.

Rico García and Vinagre Arias (2000) conducted a study with 60 students in Spain; the students were given a paper-based quiz and computer-based quiz to help them learn English grammar, vocabulary, and listening. The quizzes were in multiple-choice format. For the paper-based test, students were able to call on the teacher for help or look up information in "dictionaries, grammar, reference or exercise books" (Rico García & Vinagre Arias, 2000, p. 461), whereas for the computer-based quiz, students could click on links to get help with grammar, vocabulary, listening (to get help with pronunciation), and culture. Rico García and Vinagre Arias found that for grammar and listening help, the students who used technology referred to the online references much more than the printed resource materials or calling on the teacher for help. The computer-based quiz was found to be more motivating for the students to study grammar and listening than the paper-based test. For vocabulary, the students used printed dictionaries at the same rate as the dictionaries on the computer. The results of the achievement test also found that students attained higher scores in grammar, vocabulary, and pronunciation when using computer-based resources rather than print-based

resources. This study shows that technology can facilitate the learning of a language as well as be motivating.

2.5.1 Computer-assisted language learning and prepositions

The following studies which involve CALL and focus on prepositions are important to review because they show that students are motivated when they work with technology and that computers can facilitate the learning of prepositions with language learners. Koosha and Jafarpour (2006) compared the traditional method of teaching collocations of prepositions (explicit instruction in the classroom) with a method that involved students using a concordancing application so that they could learn which words co-occur with different prepositions. The participants were 200 Iranian EFL students at three colleges in Iran. In addition to examining which method was better, this study also studied whether the students' proficiency affected their performance with prepositions. Finally the researchers also investigated if there was a first language transfer effect on students' ability to choose the correct collocation for a preposition. The results showed that the students who used the concordancing application performed better than the students who learned the traditional way. Therefore, learning that involved technology was shown to be more effective than traditional instruction. Also, students who were more proficient in English performed better on prepositions than students who were less proficient. In addition, first language transfer did have an effect on the students' knowledge of which words collocated with the prepositions.

Ngu and Rethinasamy (2006) compared CALL with a traditional classroom in which Malaysian students learned English prepositions. The same information was used in both methods of instruction to teach prepositions. The researchers explained:

> For example, a physical chair and a ball were used to illustrate the prepositions: in front of, beside, under, and over. This was similar to one of the exercises inside

> CALL in which a ball moved around the chair and/or a box. (Ngu & Rethinasamy, 2006, p. 47)

The results showed that 85% of the students felt that CALL gave them the desire to learn whereas only 57% of the students stated that the instructor-led class stimulated them to learn. (Ngu & Rethinasamy, 2006, pp. 50-51). This study is important because it shows that students are more motivated to use technology to learn than the traditional method. However, the students who participated in the traditional classroom outperformed the students who learned using CALL. Because this study seems to go against the studies mentioned above, more research is needed.

One study (Allum, 2002) used the software Hot Potatoes to teach prepositions along with other skills using technology-based exercises. The author called these exercises tasks; the students, however, did not use these tasks to create a project. Allum (2002) investigated how CALL compared with a regular classroom with college students in Japan who were learning English. The researcher used Hot Potatoes to provide the students exercises for the CALL group. The other group learned the same content but was led by a teacher. Allum (2002) stated "the overall objective was teaching 'asking for, giving and following directions.' Objectives by category were: functions – expressions used to ask for and give directions; grammar – prepositions of location, imperative mood; vocabulary – stores and services" (p. 154). The results showed that the regular group outperformed the CALL group on the dictation of a discussion, writing a conversation, and a listening test. However, concerning prepositions, the CALL group performed better than the regular group. The researcher also reported that the students liked CALL and wanted a mixture of both CALL and teacher-led instruction.

These CALL studies show that students enjoy working with technology and that computers can motivate students to learn a second language.

2.6 Chapter Summary

This literature review has shown that PBL can be effective if it is structured and teachers give clear directions and guidance. CALL has also been found to be both enjoyable and motivating. Although there are many studies on PBL, there is a paucity of studies that teach form using PBL. Currently, there have been no technology-infused PBL studies done which involve enhanced input, explicit instruction, and production practice using a quiz-making program for English prepositions. Therefore, this current study's aim is to investigate whether a project with textual enhancement, explicit instruction, and production practice using a quiz-making program will help students improve their accuracy with prepositions. The current study's research questions are:

(1) Do adult ESL students improve their accuracy in their use of prepositions after participating in a PBL activity in which they create multiple-choice quizzes using a quiz-making program? At which stage in the project do students appear to make the most improvement?

(2) Do adult ESL students improve their accuracy in their use of prepositions after studying a list of prepositions?

(3) Which method facilitates more accuracy in the use of prepositions: the project or studying a list of prepositions?

(4) What do the adult ESL students think are the strengths and weaknesses for the project and the list?

(5) Do students transfer strategies to a new context after participating in a CALL project on prepositions?

CHAPTER 3. METHODOLOGY

3.1 Chapter Overview

Chapter two discussed theories supporting PBL as well as reviewed the literature on PBL with mainstream students and with language learners. This chapter, starts by defining and giving a rationale for conducting a case study using a mixed methods approach and then describes the participants, materials, and procedures for the study. The chapter ends with a description of the analytic process.

3.2 A Case Study Using a Mixed Methods Approach

For this project, a case study approach was selected because although there are various methods, only the case study can provide a deep and rich understanding of what occurs in a certain context. (Dornyei, 2007). A case study was also chosen because of the small number of participants, who all received both treatments (the project and the list). A case study, according to Mackey and Gass (2005), is defined as "A detailed description of a single case, for example an individual learner or a class within a specific population and setting" (p. 351).

A mixed methods approach was also used for the current study to find out whether the treatment group (the project) and stage one of the project were effective in helping students use prepositions more accurately and to examine what the students thought were the strengths and weaknesses of both the project and the list, and whether there was a transfer of strategies from the project to the list. Dornyei (2007) defined mixed methods research as including "different combinations of qualitative and quantitative research either at the data collection or at the analysis levels" (p. 24). Quantitative research has to do with collecting

data that consists mainly of numbers and later uses math to examine these data (Dornyei, 2007). Qualitative research has to do with collecting data that does not consist of numbers and later examines these data without using statistics (Dornyei, 2007). The rationale for using a mixed method approach is that it "offers a potentially more comprehensive means of legitimizing findings than do either QUAL or QUAN methods alone by allowing investigators to assess information from both data types" (Dornyei, 2007, p. 62). A quantitative study alone would not have been able to identify easily those elements that the students thought were strengths or weaknesses for the project and the list. Similarly, a purely qualitative study would not have been able to explore if the project was effective in helping students learn how to use prepositions.

Four questions on the pre-, post- and delayed post-tests were chosen to represent the more traditional way of studying prepositions (studying a list), and twelve items on the pre-, post- and delayed post-tests were used as my experimental items (the prepositions that the students studied by doing the CALL project). Of these twelve experimental items, four items were taken from stage one, four from stage two, and four from stage three. Thus there were a total of 16 questions on the pre-, post-, and delayed post-tests.

For the convenience of the reader, the research questions are listed here:

(1) Do adult ESL students improve their accuracy in their use of prepositions after participating in a PBL activity in which they create multiple-choice quizzes using a quiz-making program? At which stage in the project do students appear to make the most improvement?

(2) Do adult ESL students improve their accuracy in their use of prepositions after studying a list of prepositions?

(3) Which method facilitates more accuracy in the use of prepositions: the project or studying a list of prepositions?

(4) What do the adult ESL students think are the strengths and weaknesses for the project and the list?

(5) Do students transfer strategies to a new context after participating in a CALL project on prepositions?

Research question one involved examining the percentage of correct answers for the twelve experimental items (the project) on the pre-, post- and delayed post-tests to examine the data descriptively. A one-way within-subjects ANOVA test in SPSS (Statistical Package for the Social Sciences) was run to examine if the gains or losses for the project were statistically significant. A within-subjects design denotes that the same participants received both treatments instead of having two different groups: a control group and an experimental group. A within-subjects design was chosen because "variability in scores due to individual differences between participants will not be a factor in determining the size of the treatment effect" (O'Rourke, Hatcher, Stepanski, 2005, p. 315). The one-way within-subjects ANOVA test for the project showed that the scores on the pretest, posttest, and delayed posttest were significantly different, so paired t-tests were carried out to look at the pair-wise differences.

For the second part of research question number one, the percentage of correct answers was calculated for each of the three stages to see if the students became more proficient in each of these stages. Because all of the students did all three stages, there may have been a spill-over effect. Stage one could have influenced stage two, and stage one and two could have influenced stage three. Therefore, because the stages were mixed, a comparison of the three stages using inferential statistics could not be run; instead,

descriptive statistics compared the three stages. However, a one-way within-subjects ANOVA test was run in SPSS for stage one to find out if the gains or losses for stage one were statistically significant.

For research question two, the percentage of correct answers was calculated and examined for the four items from the list on the pre-, post- and delayed post-tests to see if there was evidence that learning may have occurred. Inferential statistics were not used to analyze whether the students learned from the list because there may have been a spill-over effect since all of the students received both treatments (the project and the list). Because all of the participants received both treatments, the project may have influenced the list making the list in actuality a combination of the list and the project. Descriptive statistics were used, however, to examine whether the list may have provided a context for learning to happen.

For research question three, because the students transferred strategies from the project to the list, no comparison between the project and the list could be carried out using inferential statistics. Instead, descriptive statistics were used to compare how much the students learned from the project and the list.

For research question number four, the students completed a questionnaire that asked them what their opinions were about the grammar-based PBL. In addition, two focus group interviews were carried out: one group with students from various countries and one group with only Chinese and Taiwanese students (for the interview questions, see Appendix B). More students had signed up to be interviewed than I had anticipated; therefore, I divided the students into these two groups to be interviewed. The two focus group interviews were semi-structured, and each lasted about 15 minutes. Group interviews were conducted rather than individual interviews for a couple of reasons. First, focus group interviews are more

appealing to participants, and the "within-group interaction can yield high-quality data as it can create a synergistic environment that results in a deep and insightful discussion" (Dornyei, 2007, p. 146). Second, in individual interviews, participants "can be too shy and inarticulate to produce sufficient data, or at the other extreme, they can be too verbose, generating a lot of less-than-useful data" (Dornyei, 2007, p. 144). For these reasons, focus group interviews were favored.

For research question number five, the questionnaire about students' opinions about the CALL project was examined, which included how they studied the list, and the students' notes were read to find out if they transferred strategies from the project to the list.

3.3 Participants

The researcher for this current study was also the instructor for the PBL unit that is the focus of this research. The project was not part of the students' regular course; it was offered for research purposes, and no grade was given.

The research/instructor was a native speaker of English. In addition, a research assistant assisted in the classroom by passing out papers, keeping track of time for the tests, and assisting students as they wrote multiple-choice questions and put them into a quiz-making program. This PBL unit for the current study was held separately from the other regular classes at the community college in which this study was done.

After receiving institutional review board (IRB) approval, fifteen students were recruited from the regular level 3, 4, and 5 classes, which were part of a non-credit ESL program at a community college in the U.S. Midwest. Each of the 15 students agreed to participate and signed a consent form; student #11 agreed to participate and was given a number but did not attend my study; therefore, there is no #11 in the data. The other 14

students participated on all three days and completed the pre-, post- and delayed post-tests. The demographics for the fourteen students are in the table below (see Table 3.1). Some of the students chose not to answer all of the questions on the survey, so some of the information is incomplete in the table.

Table 3.1. Student Demographics

Student #	1	2	3	4	5	6	7
Level	Inter	High	High	Inter	High	High	Low
Country	Mexico	Indonesia	Uzbekistan	Oman	Turkey	S. Korea	China
Age	33	30	46	39	27	43	---------
Gender	F	M	F	M	F	M	F
Education (years)	12	18	18	12	18	16	12
Student #	8	9	10	12	13	14	15
Level	High	Low	Low	Inter	Low	Low	Low
Country	Columbia	China	Iran	Iran	China	Peru	Taiwan
Age	26	---------	52	-------	24	51	---------
Gender	F	F	M	F	F	M	F
Education (years)	16	16	14	16	16	12	14

3.3.1 Grouping the participants

Students at this community college are required to take the CASAS (Comprehensive Adult Student Assessment Systems) reading test. This test assesses "real-life skills and competencies, such as paychecks, bills, and resumes" (CASAS, 2014, ¶ 2). The community college uses the CASAS test to place students into different proficiency levels (1 – 5). These levels were used to place the students into groups. Students who were in level 2 were the "low" level students, students who were in level 3 were the "intermediate" level students, and students who were in levels 4 and 5 were the "high" level students. If some of the students were taking two classes at the time of the current study (e.g., level 2 and 3), the lower level

of the two levels was used to determine which level to place them in. (For more information about CASAS, go to https://www.casas.org/training-and-support/wia-and-nrs-compliance/scale-scores-nrs-efls-and-grade-levels.)

There were three main groups: Group 1, Group 2, and Group 3, with either four or five students in each group. Although Laughlin, Hatch, Silver, and Boh (2006) found that three participants in a group was optimal, the students in the current study needed to be divided into three main groups so that each would have a handout and so that there were two to four students in a group during stage one and stage two. This balance was optimal so that there could be a high-level student in each group without making the groups too large, which could cause some students to lose interest.

Thus for the first and second stage of the project, there were five groups: 1/A1, 1/A2, 2/B1, 2/B2 and 3/C with a "high" and "low" level student in each group. For stage three, Group 1/A1 and Group 1/A2 were combined into Group 1, and Group 2/B1 and Group 2/B2 were combined into Group 2 with Group 3/C remaining the same (see Figure 3.1). This was due to the fact that there was just one group for Group 3/C.

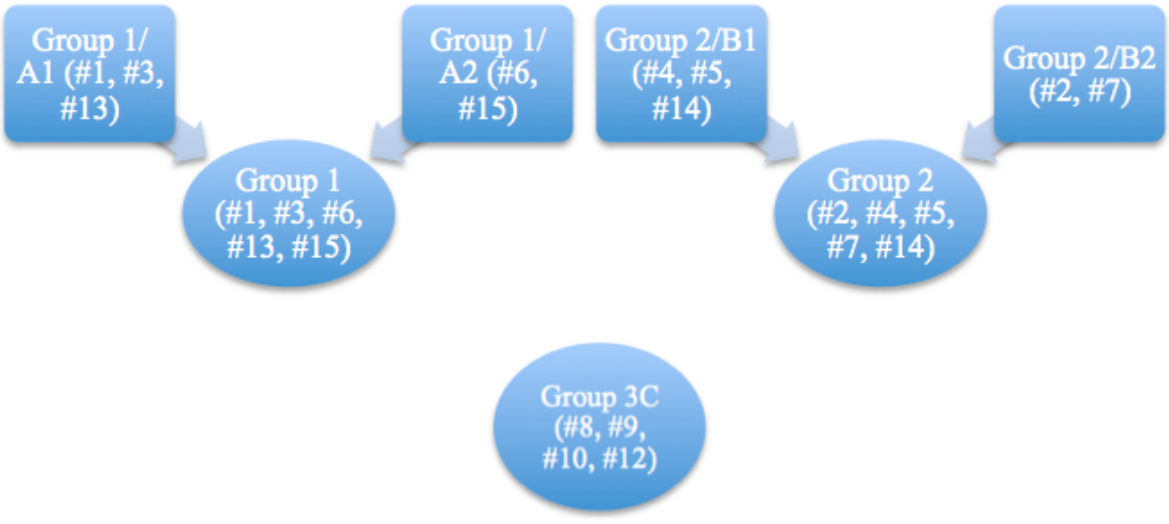

Figure 3.1. Five Groups for the Project Flowing Into Three Main Groups

The students were randomly assigned to a group using stratified sampling followed by simple random sampling. The rationale for using stratified sampling was to ensure that each group would have similar number of high-, intermediate-, and low-level students rather than have one group with all "low" or "high" level students (Kalton, 1983). The students were grouped in the following manner: A high student was placed in 1/A1, 1/A2, 2/B1, 2/B2 and 3/C; then an intermediate student was placed in 1/A1, 2/B1, and 3/C. Finally, a low student was assigned to 1/A1, 1/A2, 2/B1, 2/B2, and two low level students were placed in 3/C. Two low students were assigned to group 3/C so as to avoid having a group with more than five students in any of the stages.

3.4 Target Form

The target form for this study was English prepositions. According to Koosha and Jafarpour (2006):

> For native speakers, prepositions present little difficulty, but for a foreign/second language learner they are confusing and largely problematic. For instance, we say, *we are at the hospital*; or *we visit a friend who is in the hospital. We lie in bed but on the couch. We watch a film at the theatre but on television.* All these indicating that prepositions have strong collocational relations with other elements of language, and thus they are problematic for the EFL learners. (p. 193)

However, some specific guidelines for certain prepositions, such as facial expressions, are used with the preposition "at" (e.g., winked at, frowned at, and smiled at). These guidelines were given in the handouts to help students learn how to use the different prepositions (see Appendix A – the handouts are listed together under Appendix A, but were originally on separate pages).

3.5 Design of Study

3.5.1 Stage one

The design of the study can be seen below in Table 3.2. The place in which the study was conducted did not have Internet, so students used paper and pencil to create the multiple-choice quizzes. Each group received a different set of prepositions (Handout A, B, or C – see Appendix A). Group 1/A1 and Group 1/A2 received handout A, Group 2/B1 and Group 2/B2 received handout B, and Group 3/C received handout C. Each group wrote two multiple-choice items for each rule (each group was given eight rules in their handout) they were given. Thus, each group created 16 multiple-choice items.

3.5.2 Stage two

For stage two, because of time constraints and because there was just one group for 3/C, the "better" set of 16 multiple-choice items was chosen from the subgroups in Group One and Two after the PBL unit on Day 1. "Better" is defined as the set of 16 multiple-choice items with fewer grammatical errors. Therefore, the better 16 items between 1/A1 and 1/A2 were 1/A2's 16 items and the better 16 items between 2/B1 and 2/B2 was 2/B1's 16 items. The researcher corrected any grammar or spelling errors on 1/A2's 16 items, 2/B1's 16 items, and 3/C's 16 items so that students would be exposed to correct input. Then on Day 2, the edited items from 1/A2's group was given to group 3/C and the edited items from 2/B1's group were given to group 1/A1 and 1/A2. The edited items from Group 3/C were given to 2/B1 and 2/B2. The groups then added the 16 multiple-choice items from a different group into a quiz-making program to get exposure to a second set of prepositions.

3.5.3 Stage three

For the final stage, Group 1/A1 and Group 1/A2 were combined into Group 1, and Group 2/B1 and Group 2/B2 were combined into Group 2; Group 3/C remained the same. There were only five computers to work with, and the groups were combined since there was just one group for Group 3/C; if they had not been combined, there would not have been enough quizzes for Group 2/B1 and Group 2/B2. Each group took a practice quiz using a third group's prepositions in a quiz-making program. Therefore, each student had exposure to 48 prepositions (3 sets of 16).

Table 3.2. The Design

Stage One		
Group One subdivided into: (1/A1) (1/A2)	Group Two subdivided into: (2/B1) (2/B2)	Group Three (3/C)
Subgroup (1/A1) and Subgroup (1/A2) each created 16 items with Handout A	Subgroup (2/B1) and Subgroup (2/B2) each created 16 items with Handout B	Group 3/C created 16 items with Handout C
The researcher chose the "better" 16 items between 1/A1 & 1/A2 = 1/A2	The researcher chose the "better" 16 items between 2/B1 & 2/B2 = 2/B1	16 items created by 3/C were used.
Stage Two		
Groups 1/A1 & 1/A2 added Group Two's (2/B1) 16 items into Hot Potatoes	Groups 2/B1 & 2/B2 added Group Three's (3/C) 16 items into Hot Potatoes	Group 3/C added Group One's (1/A2) 16 items into Hot Potatoes
Group One: the two subgroups were combined	Group Two: the two subgroups were combined	Group Three
Stage Three		
Group One took Group Two's Hot Potato Quiz (Group Three's 16 items)	Group Two took Group Three's Hot Potato Quiz (Group One's 16 items)	Group Three took Group One's Hot Potato Quiz (Group Two's 16 items)

3.6 Materials

Pertaining to the materials used in this study, there were three handouts (A, B, and C): each handout had a different set of rules for prepositions (see Appendix A). There were eight rules in each handout. The rules for the prepositions were taken with minor changes from the following resources: *Collins COBUILD Grammar Patterns 1: Verbs* edited by Gill Francis, Susan Hunston, and Elizabeth Manning (1996), Common Preposition Combinations by Jennifer Mawhorter (2011) from http://media.cst.edu/uploads/genericfile/wc-common-preposition-combinations.pdf, Rick Shur's (2000) Rules for Prepositions from http://ESLprof.com /handouts/Info/preprule.doc, and *Basic English Grammar (3rd Ed.)* Betty Schrampfer Azar and Stacy A. Hagen (2006).

The prepositions were bold-faced and capitalized while the words that collocated with these prepositions were underlined. The handouts thus provided textual enhancement along with explicit instruction with the intent that the students would notice the target form and remember the rules for prepositions. As mentioned in Section 1.2.4, textual enhancement along with explanations or other learning strategies have been shown to facilitate more accuracy with the target form (DeRidder, 2002; Izumi, 2002; Khatib and Safari, 2013; Lee, 2007, Leeman, Arteagoitia, Fridman, and Doughty, 1995).

3.6.1 Content validity

To measure the content validity of the prepositions, three professors from an Intensive English Program (IEP) at a university in the U.S. Midwest were asked to rate the difficulty level of the prepositions using intuition based on their teaching experience (see Table 3.3).

Table 3.3. Ratings for the Difficulty Level of the Prepositions by Three Professors

Sets of Prepositions	Easy	Moderate	Difficult
bump into/crash into	0	3	0
anxious about/nervous about/upset about/worried about/unhappy about/sad about	1	2	0
proud of/ashamed of	1	1	1
good at/excellent at	0	3	0
surprised at/shocked at	0	1	2
accustomed to/used to	1	1	1
in the morning/in the afternoon/in the evening	2	1	0
in a car/in a taxi	3	0	0
on a island/on a farm/on a college campus/on earth/on a planet/on a plate/on the wall/on the floor/on a shelf/on the blackboard/on a table/on a desk/on the stove/on your face/a hat on your head	3	0	0
in a room/in class/in jail/in prison	2	1	0
winked at/frowned at/smiled at	1	1	1
search for/look for	1	1	1
depend on/rely on	0	0	3
happy about/excited about	0	3	0
break into/shatter into	1	1	1
in November/in the summer/in 1987/in the 20th century	3	0	0
in Des Moines/in Florida/in Korea/in North America	2	1	0
on the bus/on the train/on the subway/on a plane/on a jet/on a ship	2	1	0
on the coast/stand on the line	1	1	1
cup of sugar/a teaspoon of olive oil/a cup of rice/a pound of hamburger	2	1	0
agree with/disagree with	1	1	1
borrow from/quote from	1	0	2
prepare for/study for	0	0	3
grateful for/thankful for	0	0	3
bad at/terrible at	0	3	0
on Monday/on Christmas Day	2	1	0
in the closet/in a drawer/in a cup/in a bowl/in a glass/in your mouth/ideas in your head	3	0	0
on TV/on the radio/on the phone/on the computer/on a CD	1	2	0
at the park/at the grocery store/at the bookstore/at the gas station/at the library	3	0	0

Table 3.3. continued

concentrate on/focus on	0	1	2
hungry for/long for	0	1	2
dissatisfied with/satisfied with	0	1	2
capable of/incapable of	0	0	3
think about/ponder about	0	2	1

The three professors have been teaching for 12 years, 13 years, and 38 years. The prepositions were grouped in sets and were used in the handouts (A, B, and C), the list of 16 prepositions, and the pretest, posttest, and delayed posttest.

The three professors gave a rating of one for an "easy" set of prepositions (e.g., in a car or in a taxi), a rating of two for a set of prepositions that were "moderately difficult" (e.g., bad at or terrible at), and a rating of three for a "difficult" set of prepositions (e.g., capable of or incapable of). A definition for "easy," "moderately difficult," and "difficult" was not given. The numbers in Table 3.3 refer to the number of times that each difficulty level was voted for. Prepositions that lacked agreement were not used on the pretest, posttest, or delayed posttest.

After receiving the ratings, the three handouts (Handout A, B, and C) were created as well as the list of 16 prepositions (see Appendix G) so that the handouts and list would each contain eight sets of prepositions. The level 3 (difficult) sets of prepositions were divided as evenly as possible into each of the four groups (the three handouts and the list of 16 prepositions); this was also done with the level 2 (moderately difficult) sets of prepositions and the level 1 (easy) sets of prepositions. The sets of prepositions in which there was no agreement among the professors as far as difficulty level were also divided as evenly as possible among the four groups so that the four groups were comparable as far as difficulty level.

There were 35 sets of prepositions rated by the professors, and there were 13 sets about which there was complete agreement. Fifteen sets of prepositions had agreement with two professors and seven sets of prepositions showed low content evidence for validity (i.e., there was no agreement among the professors). Since only 32 sets of prepositions were needed, the following three sets were unused: break/shatter into, proud/ashamed of, and surprised/shock at. Thus there were eight sets of prepositions on Handouts A, B, and C as well as on the list of prepositions. Each of the four groups (Handouts A, B, C, and the list) had at least one "easy" set of prepositions, one "moderately difficult" set of prepositions, and two "difficult" sets of prepositions.

3.6.2 Pretest, posttest, and delayed posttest

One "easy" set of prepositions, one "moderately difficult" set of prepositions, and two "difficult" sets of prepositions were selected from each of the four groups (Handouts A, B, C, and the list of prepositions) to create a pretest, posttest, and delayed posttest. Thus, the pretest, posttest, and delayed posttests consisted of 16 items: four questions were from Handout A, four questions were from Handout B, four questions were from Handout C, and four questions were from the list of prepositions. Also, for the pretest, posttest, and delayed posttests, care was taken so that no prepositions were included that had no agreement among the professors for difficulty level.

The pretest, posttest, and delayed posttests were similar in that each of them had the same prepositions and words that collocated with them. However, the sentences in which the prepositions were embedded were different. To ensure that the difficulty level of the sentences and words were similar, sentences were composed by using the first 1,000 words from Nation's BNC 14k lists (Nation, n.d.; http://www.lextutor.ca/vp/comp/nation_14/). In

addition, three Ph.D. students who were native speakers of English examined the pretest, posttest, and delayed posttests and gave me feedback on how to keep the three tests equivalent. Every effort was made to keep the grammatical structure the same for each of the sentences in which the prepositions were embedded so that differences could be eliminated as confounding factors in the research identified (Mackey & Gass, 2005).

The three Ph.D. students also identified any items on the pretest, posttest, and delayed posttest that could have several different prepositions as the answer. In response to this, the first eight questions on the pretest, posttest, and delayed posttests were multiple-choice with four options for the items that could have more than one answer, and for the other eight questions, which had only one correct answer, fill-in-the-blank questions were used.

3.6.3 Hot Potatoes software

The program Hot Potatoes (Arneil & Holmes, 1997; http://hotpot.uvic.ca/) was used to allow the students to create quizzes for stage two of the project. Hot Potatoes was chosen because this program gives immediate feedback and thus makes it easier for the students to learn how to use prepositions. This program was "developed by the research and development team at the University of Victoria Humanities Computing and Media Centre" (Arneil & Holmes, 2012, ¶ 1). The authors originally wanted to create interactive exercises on the Internet for their own use (Arneil & Holmes, 1999). The purpose of creating this program was to allow people who have a basic proficiency with computers to be able to create quizzes (Arneil & Holmes, 1999). With Hot Potatoes, five kinds of interactive exercises "JCloze, JMatch, JQuiz, JCross, and JMix" can be created for the Internet (Arneil & Holmes, 2012, ¶ 6). It can also be used without the Internet. The students were given handouts that gave step-by-step instructions on how to make quizzes with Hot Potatoes. An

example of what students saw can be seen in Appendix C but has been de-identified for issues of anonymity. The intent of these handouts was to give more structure to the PBL activity and thus provide scaffolding for the students.

3.7 Procedure

Data collection consisted of three days: Day 1 was on a Tuesday, Day 2 was on Wednesday, and Day 3 was one week later on a Thursday. A summary of the procedure as well as the evidence sought can be seen in Table 3.4.

Table 3.4. Procedures and Evidence Sought

Procedure		CALL Project	List	Data Collection	Evidence Sought
Day 1	Stage one	3) Create 16 multiple-choice items	4) Study list	1) Demographics survey 2) Pretest	Students' characteristics Initial level of knowledge of prepositions
Day 2 (One day later)	Stage two	2) Enter another group's 16 multiple-choice items into Hot Potatoes	1) Students returned their lists	4) Posttest 5) Questionnaire about the students' opinions	Learning gains Factors that may impact learning
	Stage three	3) Take another group's quiz			
Day 3 (Nine days later than Day 1)				1) Delayed posttest 2) Two focus group interviews	Lasting learning gains Factors that may impact learning

3.7.1 Day 1

On Day 1, 14 participants arrived to participate in the study; they had all signed the consent form. The students filled out a demographic survey. Student #11 did not come. Next

the students took the timed pretest. They were given 10 minutes to complete the test. The students were then randomly assigned to a group and given a handout with an example of what was expected. The rule "communicate with and talk with" was on the handout as well as example sentences and two multiple-choice items using this rule (see Appendix H). Each group received a handout (either Handout A, B, or C) with eight sets of prepositions and 16 example sentences. The students were told that these prepositions on the handouts would be on the posttest. Each group was then given a blank lined sheet numbered from one to 16. Next the students created 16 multiple-choice items based on the eight rules that were on their handout. Each group wrote two multiple-choice items for each rule so that they each created 16 multiple-choice questions. One student from each group was the "recorder" and wrote the multiple-choice items for the group. All handouts and quizzes that the students had created were then collected, and a list of 16 prepositions that were in alphabetical order was distributed. The students were directed to study this list, and it was suggested that they could memorize the list, create their own sentences, read them out loud, or copy them down. They were asked to keep track of how long they studied this list and the method that they used. They were also told that the prepositions would be on the posttest the next day and to bring the list the next day (Day 2). Day 1 lasted about an hour and a half. The "better" or more accurate 16 multiple-choice items of the two subgroups was selected to use for Day 2. The "better" quizzes were created by Group 1/A2 and Group 2/B1.

3.7.2 Day 2

On Day 2, the lists of 16 prepositions were collected; however, student #2 forgot to bring his list. (Student #2 returned the list on the following Monday in the morning; he reported that he had not studied the list the extra days that he had had it.) The same 14

students participated on Day 2; student #11 did not come. The students divided themselves so that they were in the same group as Day 1. The instructions on how to use Hot Potatoes were distributed to each group, and each group was given a different group's 16 multiple-choice quiz. For example, Group 1/A2 typed in 2/B1's 16 multiple-choice items and Group 2/B1 typed in 3/C's quiz (see Table 3.2). Students were told that the prepositions they typed into the computer would be on the posttest. Because the instructions on how to use Hot Potatoes did not copy well, the students were offered help to create quizzes in the quiz-making program. Each group had a "recorder" who entered the 16 multiple-choice items into the quiz-making program except for Group 1/A2: Group 1/A2 (students #6 and #15) shared the worked and each typed in eight multiple-choice items. The paper quizzes that were created by the students and the instructions on how to use Hot Potatoes were then collected, and the subgroups were joined so that there were three groups instead of five: Group 1, Group 2, and Group 3 (see Figure 3.1). Each group took a third group's Hot Potatoes quiz. The students were instructed to work together to answer the quiz questions and were told that the prepositions on the computer would be on the posttest.

After the students took the practice quiz on the computer in groups, they individually took the timed posttest (10 minutes) and then filled out a questionnaire on their opinions about PBL, how long they had studied the list, and what method they had used. Although the lists of prepositions were collected from the students, the students may have taken notes. Therefore, they were asked not to study their notes from the list between Day 2 and Day 3. The quizzes that were created on the computer were then saved to a thumb drive. Day 2 lasted about one hour and 45 minutes.

3.7.3 Day 3

The same 14 students participated on Day 3; student #11 did not come. The students reported on the delayed posttest whether they had studied the list of prepositions since the last time we had met. They then took the timed delayed posttest (10 minutes). The four students who were not part of the focus group interviews were dismissed; they were students #2, #3, #10, and #12.

3.7.3.1 Focus Group Interviews

A semi-structured interview with the first focus group lasted for 15 minutes. There were six students in the first group; they were from various countries. The students' demographics are listed below in Table 3.5.

Table 3.5. Focus Group 1 Participants' Demographics

Student	Gender	Education (Years)	Age	Country
#1 (I)	Female	12	33	Mexico
#4 (I)	Male	12	39	Oman
#5 (H)	Female	18	27	Turkey
#6 (H)	Male	16	43	Korea
#8 (H)	Female	16	26	Columbia
#14 (L)	Male	12	51	Peru

Next a semi-structured interview with a second group was conducted, which had four students who were all Chinese or Taiwanese. The students' backgrounds are listed below. Some of the students chose not to report their age, so this information is missing from Table 3.6.

Table 3.6. Focus Group 2 Participants' Demographics

Student	Gender	Education (Years)	Age	Country
#7 (L)	Female	12	-------	China
#9 (L)	Female	16	-------	China
#13 (L)	Female	16	24	China
#15 (L)	Female	14	-------	Taiwan

In the second group, for students who were challenged with the English-only nature of the interview, another student helped them understand by translating into their native language (for the interview questions, see Appendix B). Their responses were analyzed both quantitatively and qualitatively as outlined in the following section.

3.8 Analysis

3.8.1 Questionnaire

A quantitative approach was employed to analyze the data from the closed-ended questions on the questionnaire; and for the open-ended questions, open coding (see below) was used. For the closed-ended questions, I calculated how many students liked the project, list, or both and converted this number into a percentage. It should be noted that student #10 did not answer some of the questions on the questionnaire; however, I included him in the percentages.

3.8.2 Focus group and open-ended items from the questionnaire

In order to analyze the qualitative data, the two focus group interviews were transcribed, and open coding (Mackey & Gass, 2005) was used to find themes from the two interviews and open-ended items on the questionnaire.

First, for the focus group interviews and questionnaire, the data were organized by questions. That is, all of the students' responses that were related to a certain question were

identified and placed under that question. Then all of the students' responses that had to do with the second question were identified and put under that question. This procedure was followed with all of the questions. In grouping the interviews in this way, some of the same students' responses were recorded more than once in the transcriptions because some of their responses answered more than one question. From this, open coding was used; that is, themes were identified that came from the data instead of predetermining them (Mackey & Gass, 2005). This was especially useful for responding to research question number four (what the students thought were the strengths and weaknesses of the list and the project) in the data from focus group 1, focus group 2, and the questionnaire. All in all, 23 themes were identified and coded and will be described in Chapter 4.

3.9 Chapter Summary

This chapter has described the study, its participants, and the methods used in the data collection and analysis. It has also provided the rationale for using a case study with a mixed methods approach. The next chapter will discuss the results.

CHAPTER 4. RESULTS

4.1 Chapter Overview

Chapter three explained the methods, participants, and procedures used in this study. In this chapter, the results of the quantitative analyses will be discussed. In addition, this chapter will discuss the results of the qualitative data analysis: the perceived strengths and weaknesses of the project and the list. Finally, it will conclude with two tables summarizing the key findings, which will be discussed in Chapter five.

4.2 Quantitative Data

In this study, there was only one pretest, posttest, and delayed posttest given to each student. The data were analyzed by looking at the students' performance on the pretest, posttest, and delayed posttest. Twelve items (four items were from stage one, four from stage two, and four from stage three) for the pre-, post-, and delayed posttests were from the project, and four items were from the list: a total of 16 questions on the pretest, posttest, and delayed posttest.

4.2.1 Initial level of knowledge of prepositions

4.2.1.1 Pretest for the List, Project, and Three stages

The results of the pretests can be seen below. As was expected, in general, the high-level (H) students performed better than the intermediate-level (I) students and low-level (L) students on the pretest for both the list and the project. In fact, students #2, #5, and #6 scored 100% on the pretest for the list, which meant that these students could not improve their scores. Their scores could only fall or remain the same on the posttest and delayed posttest. The overall average scores for the pretest for the list = 68% and for the project = 48%.

Therefore, the students, in general, performed better on the list than on the project. In addition, the students scored the highest on stage two followed by stage three than stage one.

Table 4.1. Pretest

Pretest					
Student #	List	Project	Stage One	Stage Two	Stage Three
1(I)	25%	25%	0%	50%	25%
2(H)	100%	58%	50%	50%	75%
3(H)	75%	58%	25%	75%	75%
4(I)	50%	25%	25%	0%	50%
5(H)	100%	75%	100%	50%	75%
6(H)	100%	67%	75%	75%	50%
7(L)	75%	42%	25%	50%	50%
8(H)	50%	75%	50%	100%	75%
9(L)	75%	50%	50%	75%	25%
10(L)	100%	50%	50%	50%	50%
12(I)	50%	50%	25%	50%	75%
13(L)	25%	25%	0%	50%	25%
14(L)	75%	33%	50%	25%	25%
15(L)	50%	33%	25%	75%	0%
Average	68%	48%	39%	55%	48%

4.2.2 Learning gains

4.2.2.1 Posttest for the Project

After the students took the Hot Potatoes quizzes in groups (stage three), they took the posttest. The posttest showed that the students learned by doing the CALL project. For the items from the project, the participants made a statistically significant average gain of 14% from the pretest to the posttest ($p = .001$).

In addition, all eight of the intermediate and high-level students' scores increased from the pretest to the posttest. For the low-level students, four of them (#9, #13, #14, #15) had better scores on the posttest than the pretest. The other two low-level (#7 and #10) students performed worse on the posttest than on the pretest. After the posttest, student #10

(questionnaire) reported: " I didn't understand your project." He was also the only participant that did not completely fill out the questionnaire about the students' opinions about PBL. Concerning the posttest for the project, the data suggest that the intermediate and high-level students, as well as four of the six low-level students, all learned by doing the project.

4.2.2.2 Posttest for the List

The students seemed to learn by studying the list. Pertaining to the students' performances from the pretest to the posttest for the items on the list, there was an average increase of 12%. Four out of the eight intermediate and high-level students' scores increased while three (#2, #5, & #6) of these eight had perfect scores on the pretest and again scored 100%. Student #1's score stayed the same.

For the low-level students, three of these students' scores increased while two low-level students' scores stayed the same. Therefore, all of the students' scores stayed the same or increased except for student #7 (a low-level student) whose score fell.

Table 4.2. Students' Performance on the Posttest for the List and Project

List		
Student #	Pretest	Posttest
1(I)	25%	25%
2(H)	100%	100%
3(H)	75%	100%
4(I)	50%	100%
5(H)	100%	100%
6(H)	100%	100%
7(L)	75%	0%
8(H)	50%	100%
9(L)	75%	100%
10(L)	100%	100%
12(I)	50%	75%
13(L)	25%	50%

Project		
Student #	Pretest	Posttest
1(I)	25%	42%
2(H)	58%	83%
3(H)	58%	67%
4(I)	25%	50%
5(H)	75%	92%
6(H)	67%	100%
7(L)	42%	33%
8(H)	75%	83%
9(L)	50%	75%
10(L)	50%	42%
12(I)	50%	75%
13(L)	25%	33%

Table 4.2. continued

14(L)	75%	75%
15(L)	50%	100%
Average	68%	80%

14(L)	33%	50%
15(L)	33%	42%
Average	48%	62%

4.2.2.3 Posttest for the 3 Stages

In this study, there was only one pretest, posttest, and delayed posttest given to each student. The project consisted of three stages: stage one, stage two and stage three. Twelve items (four items were from stage one, four from stage two, and four from stage three) on the pre-, post-, and delayed posttests were for the project while four items were for the list. Therefore, in order to posttest each stage, a 16-item test was given with four items originating from stage one, four items coming from stage two, and four items stemming from stage three.

One can surmise from Table 4.3 that the students' scores increased by an average of 11% or more for each of the three stages of the project. Stage three (students taking each other's quizzes) had the biggest average gain with a 20% increase between the pretest and posttest. For the intermediate and high-level students, seven out of the eight students' scores increased while one of them stayed the same. In addition, three low-level students' scores increased while one low-level student's score remained the same from the pretest to the posttest. The scores from only two students (#7 and #10) fell; they were both low-level students. Student #10 said he did not understand the project on the questionnaire.

Table 4.3. Students' Performances for the Three Stages

	Stage One			Stage Two			Stage Three	
Student #	Pretest	Posttest		Pretest	Posttest		Pretest	Posttest
1(I)	0%	0%		50%	50%		25%	75%
2(H)	50%	100%		50%	50%		75%	100%
3(H)	25%	25%		75%	75%		75%	100%
4(I)	25%	75%		0%	25%		50%	50%
5(H)	100%	100%		50%	75%		75%	100%
6(H)	75%	100%		75%	100%		50%	100%
7(L)	25%	25%		50%	75%		50%	0%
8(H)	50%	50%		100%	100%		75%	100%
9(L)	50%	75%		75%	50%		25%	100%
10(L)	50%	50%		50%	50%		50%	25%
12(I)	25%	50%		50%	75%		75%	100%
13(L)	0%	0%		50%	75%		25%	25%
14(L)	50%	50%		25%	50%		25%	50%
15(L)	25%	25%		75%	75%		0%	25%
Average	39%	52%		55%	66%		48%	68%

Stage one, in which students created 16 multiple-choice items, showed the next biggest gain, an average increase of 13% between the pretest and posttest. None of the students' scores fell from the pretest to the posttest for stage one. Four of the eight intermediate and high-level students' scores went up while the other four students' scores stayed the same. Five of the six low-level students' scores stayed the same while only one low-level student's score went up.

Stage two (students typed another group's quiz into a quiz-making program) also had a substantial average gain of 11%. Four intermediate and high-level students' scores rose while the other four students' scores stayed the same. For the low-level students, three students scored higher on the posttest than the pretest for stage two while two students' scores stayed the same and one student's score fell.

4.2.3 Lasting learning gains

4.2.3.1 Delayed Posttest for the Project

In order to investigate whether the gains or losses were lasting, the students took a delayed posttest a little over one week after the pretest. The results are shown below in Table 4.4. For the project items, there was an average gain of 6% between the pretest and the delayed posttest; however, this gain was not statistically significant ($p = .136$). Six out of the eight intermediate and high-level students' scores increased from the pretest to the delayed posttest while two of these students' scores remained the same.

Three low-level students' (#7, #14, and #15) scores fell. Two low-level students scored the same while only one low-level student performed better from the pretest to the delayed posttest.

Something to note was that student #15 was ill and did not attend her regular class on the day of the delayed posttest but was present to take the delayed posttest on Day 3. In Section 4.2.3.2, it can be seen that student #15 scored lower on the delayed posttest than on either the pretest or the posttest for the list as well as for the project. This suggests that caution should be exercised in interpreting patterns that may be supported or refuted by student #15's participation.

As can be seen in Table 4.4, the students' scores dropped by an average of 8% from the posttest to the delayed posttest for the project items; only the scores from students #3, #5, & #10 increased from the posttest to the delayed posttest. Students #3 and #5 were high-level students while student #10 was a low-level student.

Table 4.4. Students' Performances on the Delayed Posttest for the Project

Project			
Student #	Pretest	Posttest	Delayed
1(I)	25%	42%	42%
2(H)	58%	83%	83%
3(H)	58%	67%	73%
4(I)	25%	50%	42%
5(H)	75%	92%	100%
6(H)	67%	100%	75%
7(L)	42%	33%	25%
8(H)	75%	83%	75%
9(L)	50%	75%	67%
10(L)	50%	42%	50%
12(I)	50%	75%	50%
13(L)	25%	33%	25%
14(L)	33%	50%	25%
15(L)	33%	42%	17%
Average	48%	62%	54%

4.2.3.2 Delayed Posttest for the List

For the items from the list (see Table 4.5 below), there was only a 2% average increase in scores from the pretest to the delayed posttest. The scores of three low-level students (#7, #10, and #15) fell from the pretest to the delayed posttest. Two low-level students' scores stayed the same while only one low-level student (#13) rose from the pretest to the delayed posttest. Three high-level students (#2, #5, & #6) who scored 100% on the pretest were able to keep their scores at 100% on the delayed posttest. In addition, three intermediate and high-level students attained higher scores while two intermediate and high-level students scored the same from the pretest to the delayed posttest for the list.

The students' scores dropped by an average of 10% from the posttest to the delayed posttest for the items from the list; only three students made a gain between the posttest and delayed posttest (students #1, #7, #13). It is important to note that for the list, nine students

scored 100% on the posttest, so there was no room for the students to improve on the delayed posttest; these students could only score the same or receive a lower score. Of these nine students, only three students (#2, #5, #6) were able to keep their score of 100% between the posttest and delayed posttest; these three students were all high-level students. Student #15 went from a score of 100% on the posttest to a score of 25% on the delayed posttest for the list. As addressed earlier, it should be noted that she was ill on the day that she took the delayed posttest.

Table 4.5. Students' Performances on the Delayed Posttest for the List

List			
Student #	Pretest	Posttest	Delayed
1(I)	25%	25%	50%
2(H)	100%	100%	100%
3(H)	75%	100%	75%
4(I)	50%	100%	50%
5(H)	100%	100%	100%
6(H)	100%	100%	100%
7(L)	75%	0%	25%
8(H)	50%	100%	100%
9(L)	75%	100%	75%
10(L)	100%	100%	50%
12(I)	50%	75%	75%
13(L)	25%	50%	75%
14(L)	75%	75%	75%
15(L)	50%	100%	25%
Average	68%	80%	70%

4.2.3.3 Delayed Posttest for Stage One

Remarkably, there was an average increase between the posttest and the delayed posttest (2%) for stage one (see Table 4.6), resulting in an average gain of 15% between the pretest and delayed posttest. This stage was the only stage in which there was an average

increase (2%) between the posttest and the delayed posttest. Seven out of the 14 students' scores rose from the pretest to the delayed posttest for stage one. Only students #10, #14, and

Table 4.6. Students' Performances on the Delayed Posttest for Stage One

	Stage One		
Student #	Pretest	Posttest	Delayed
1(I)	0%	0%	25%
2(H)	50%	100%	100%
3(H)	25%	25%	100%
4(I)	25%	75%	25%
5(H)	100%	100%	100%
6(H)	75%	100%	100%
7(L)	25%	25%	50%
8(H)	50%	50%	50%
9(L)	50%	75%	100%
10(L)	50%	50%	25%
12(I)	25%	50%	50%
13(L)	0%	0%	0%
14(L)	50%	50%	25%
15(L)	25%	25%	0%
Average	39%	52%	54%

#15 scored lower from the pretest to the delayed posttest. All three of these students were low-level students, and #15 was ill. Two low-level students' scores rose from the pretest to the delayed posttest while one low-level student's score remained the same. Five out of the eight intermediate and high-level students' scores increased; the other three students' scores stayed the same.

4.2.3.4 Delayed Posttest for Stage Two

For stage two (see Table 4.7), the students actually scored an average of 1% lower on the delayed posttest than on the pretest. In contrast to stage one, seven out of the 14 students scored the same on the pretest and delayed posttest. Of these seven, five of them were intermediate or high-level students and the other two were low-level students. Only students

#4 (I), # 5 (H), and #13 (L) scored higher from the pretest to the delayed posttest for stage two. The scores from four students (#3 (H), #7 (L), #9 (L), and #15 (L)) fell from the pretest to the delayed posttest for stage two.

Table 4.7. Students' Performances on the Delayed Posttest for Stage Two

	Stage Two		
Student #	Pretest	Posttest	Delayed
1(I)	50%	50%	50%
2(H)	50%	50%	50%
3(H)	75%	75%	50%
4(I)	0%	25%	25%
5(H)	50%	75%	100%
6(H)	75%	100%	75%
7(L)	50%	75%	25%
8(H)	100%	100%	100%
9(L)	75%	50%	50%
10(L)	50%	50%	50%
12(I)	50%	75%	50%
13(L)	50%	75%	75%
14(L)	25%	50%	25%
15(L)	75%	75%	25%
Average	55%	66%	54%

4.2.3.5 Delayed Posttest for Stage Three

For stage three (see Table 4.8), there was an average gain of 6% between the pretest and the delayed posttest. Only students #7 (L), #12 (I), and #13 (L) scored lower from the pretest to the delayed posttest. Three low-level students' scores rose while one stayed the same from the pretest to the delayed posttest for stage three. For the intermediate and high-level students, four students had higher scores while three had the same score from the pretest to the delayed posttest.

Table 4.8. Students' Performances on the Delayed Posttest for Stage Three

	Stage Three		
Student #	Pretest	Posttest	Delayed
1(I)	25%	75%	50%
2(H)	75%	100%	100%
3(H)	75%	100%	75%
4(I)	50%	50%	75%
5(H)	75%	100%	100%
6(H)	50%	100%	50%
7(L)	50%	0%	0%
8(H)	75%	100%	75%
9(L)	25%	100%	50%
10(L)	50%	25%	75%
12(I)	75%	100%	50%
13(L)	25%	25%	0%
14(L)	25%	50%	25%
15(L)	0%	25%	25%
Average	48%	68%	54%

4.2.3.6 One -Way Repeated Measures ANOVA Test for the Project

In an attempt to determine whether the gains or losses for the project were statistically significant, a one-way repeated measures ANOVA test was run for the project. By conducting this test, I could determine with certainty whether or not the students in this case study learned due to the project. A one-way repeated measures ANOVA test, however, was not run for the list because there may have been a spill-over effect from the project to the list, making the list a combination of the project and the list.

There was one independent variable for the one-way repeated measures ANOVA test for the project—test time—which included three measures (pretest, posttest, and delayed posttest). The dependent variable was the scores on the 12 items for the project. The one-way repeated measures ANOVA test in SPSS for the project showed that the scores on the pretest, posttest, and delayed posttest were significantly different, $F(2, 26) = 8.46$, $p = .001$. Paired t-

tests were run to look at the pair-wise differences. The t-tests showed that the students' scores on the posttest (M = 7.43, SD = 2.74) of the project were statistically significantly higher than their scores on the pretest (M = 5.71, SD = 2.13), $t(13) = 4.31$; $p = .001$. Partial eta squared was .588; fifty-nine percent of the score variance was due to test time. Thus, the effect was large. Even though there was a small sample, statistical significance was found and this shows that it can be stated with some level of confidence that the students in this case study learned. However, the students' scores between the posttest (M = 7.43, SD = 2.74) and delayed posttest (M = 6.43, SD = 3.11) were significantly lower $(t(13) = 2.46; p = .029)$. Partial eta squared was .318; thirty-two percent of the score variance was due to test time; therefore, the effect was large. The students' scores on the delayed posttest (M = 6.43, SD = 3.11) were slightly higher than their scores on the pretest (M = 5.71, SD = 2.13) although this increase was not statistically significant $(t(13) = 1.59; p = .136)$.

4.2.3.7 One -Way Repeated Measures ANOVA Test for Stage One

A one-way repeated measures ANOVA test was run for stage one to examine if the gains or losses for stage one were statistically significant. By running this test, I could determine with confidence whether or not the students in this case study learned due to stage one. Inferential statistics could not be run for stage two and stage three, however, because there may have been a spill-over effect from one stage to another, making stage two a mixture of stage one and two and stage three a combination of stage one, stage two, and stage three.

There was one independent variable for the one-way repeated measures ANOVA test for stage one, again test time, which included three measures (pretest, posttest, and delayed posttest). The dependent variable was the scores on the four items for stage one (creating 16

multiple-choice items). The one-way repeated measures ANOVA test in SPSS for stage one showed that the scores on the pretest, posttest, and delayed posttest were not significantly different, $F(2, 26) = 2.31$, $p = .119$. However, the pairwise comparisons showed that the students' scores on the posttest ($M = 2.07$, $SD = 1.38$) of stage one were significantly higher than their scores on the pretest ($M = 1.57$, $SD = 1.09$) $t(13) = 2.46$, $p = .029$. Partial eta squared was .318; thirty-two percent of the score variance was due to test time; therefore, the effect was large. The gains from the posttest ($M = 2.07$, $SD = 1.38$) to delayed posttest ($M = 2.14$, $SD = 1.56$) and pretest ($M = 1.57$, $SD = 1.09$) to delayed posttest ($M = 2.14$, $SD = 1.56$) were not significantly different $p = .83$ and $p = .10$, respectively.

4.2.4 Differences between instructional techniques

4.2.4.1 Project vs. the List

The mean scores, standard deviations, and raw scores for the project and the list are in Table 4.9 below. There was an increase of .72 (6%) in the average score from the pretest to the delayed posttest for the project and an increase of only .08 (2%) in the average score from the pretest to the delayed posttest for the list.

Table 4.9. Mean Scores and Standard Deviations for the Project and the List (N = 14)

	Project			List	
Tests	*M*	*SD*	*p*-value	*M*	*SD*
Pretest	5.71	2.13		2.71	1.07
Posttest	7.43	2.74	.00*	3.21	1.31
Delayed Posttest	6.43	3.11	.14	2.79	1.05

Note. *$p < .05$

4.2.4.2 Comparing the Three Stages

Concerning the three stages, there was an increase of .57 (15%) for the average score for stage one from the pretest to the delayed posttest and a decrease of .07 (-1%) for stage two.

Stage three had an increase of .21 (6%) for the average score from the pretest to the delayed posttest.

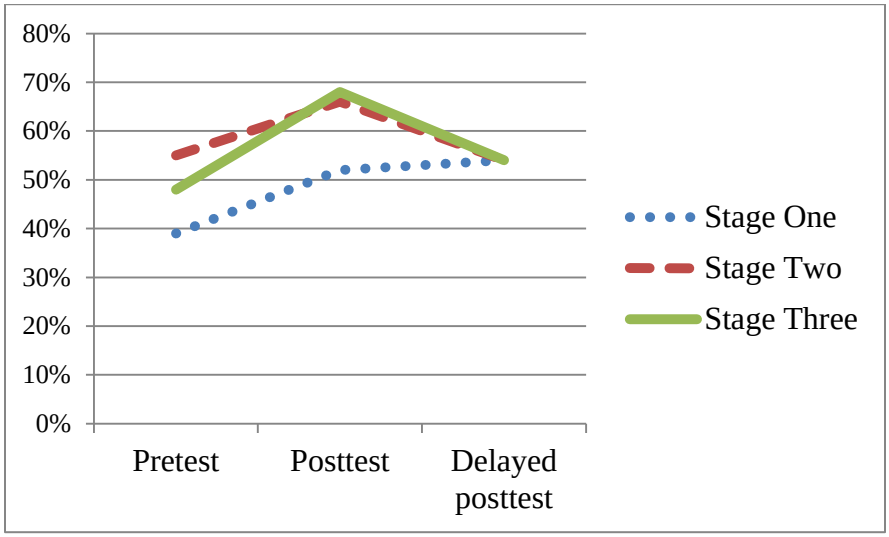

Figure 4.1. Students' Scores on Pretest, Posttest, and Delayed Posttest for the Three Stages

Table 4.10. Mean Scores and Standard Deviations for the Three Stages (N = 14)

	Stage One			Stage Two		Stage Three	
Tests	*M*	*SD*	*p*-value	*M*	*SD*	*M*	*SD*
Pretest	1.57	1.09		2.21	.97	1.93	1.00
Posttest	2.07	1.38	.03*	2.64	.84	2.71	1.49
Delayed Posttest	2.14	1.56	.10	2.14	1.03	2.14	1.29

Note. *$p < .05$

4.3 Factors That May Impact Learning

4.3.1 Questionnaire

There were a variety of factors that may have impacted learning that came from the questionnaire and two focus group interviews. A discussion will be given about factors that may have impacted learning from the questionnaire. The students' responses here and following are quoted *verbatim*, including their typos.

4.3.1.1 Perceptions of Instructional Techniques

Question #1 of the questionnaire (see Appendix D) read "Would you rather do a project such as the preposition project or study a list of prepositions?" Two out of 14 students (14%) answered "I would rather do a project," and four out of 14 students (29%) answered "I would rather study a list of prepositions." Seven out of the 14 students (50%) said that they would like to do both projects and study a list or prepositions. It should be noted that student #10 chose not to answer question #1.

Question #2: "Which stage did you like the best?" The qualitative data from the questionnaire were combined with the responses from the two focus group interviews to answer this question because there was some confusion about what the different stages were (see Section 4.3.2.1). Student #10 (7%) did not answer this question. Thus, six out of the 14 students (43%) liked stage 3 the most, and five (36%) liked stage 1. Only two students (14%) liked stage 2.

Question #3 read "Did you like the preposition project?" Ten out of the 14 students (71%) of the students said "Yes," and three out of the 14 students (21%) said "A little." Just one out of the 14 students (7%) said: "No."

Question #4 asked "Would you like to do another project in the future?" Eleven out of the 14 students (78%) answered "Yes" while three out of the 14 students (21%) answered "No."

There was, however, some confusion about the project and the list, and the pretest, posttest, and delayed posttest. The data suggested that some students may have thought that the project included studying the list and the pretest, posttest, and delayed posttest and so when they answered they liked the project; they may have liked the list and tests as well. For

example, on the questionnaire, when asked, “What did you like about the preposition project?” Student #12 (an intermediate-level student) wrote “I like to write it down in my notebook.” Student #12 had written notes while studying the list, so she may have thought that the project included studying the list of prepositions. A oral explanation attempted to address the misconception that the list was different from the project, and before the two focus group interviews, a visual was presented to the students who were participating in the interview to help them understand the difference between the list and the project. The students thus seemed to understand the difference between the list and the project by the time they participated in the focus group interviews. Ultimately there may still have been confusion regarding whether the pretest, posttest, and delayed posttest were part of the project, particularly concerning stage three. Data from the focus group interviews carried out with the Chinese students (all low-level students) supported this.

Questions #5 and #6 read “What did you like about the preposition project?” “What did you not like about the project?” For these two questions, the students’ responses from the questionnaires were combined with the two focus group interviews and open coding was used to analyze the students’ responses (see Section 4.3.2.1 below). One thing to note is that on the questionnaire, student #7 had conflicting answers when answering these two questions. For example, when answering what she liked about the project, she wrote “taking the practice quizzes” but when responding to what she did not like about the project she wrote: “I not like computer test.” Thus again, the findings must be interpreted with caution.

4.3.1.2 List Studying Strategies

Question #7 asked “Did you study the list of prepositions?” All of the students circled “yes” except for three students. However, two of the three students (#7 and #13), who

reported that they had not studied the list, each reported studying the list for 20 minutes and even explained how they studied the list on the questionnaire. These two students may have misread this question. The other student (#10) chose not to answer this question.

Question #8 read "If you did study the list of prepositions, how many minutes or hours did you study them?" The lowest amount of time that the students studied the list was five minutes, and the highest amount was 60 minutes (student #10 chose not to answer this question); the average was 21 minutes.

Question #9 asked "How did you study the list of prepositions?" Did you try to make rules or just memorize them? The students responded to this on the questionnaire, but an examination of their notes showed a more detailed picture of how they studied the list. The notes included what the students wrote on the list as well as any notes they handed in along with the list. In addition, during the focus group interviews, the students reported how they studied the list.

The participants used strategies that could be categorized into two groups: note-taking and mental processing. The strategy grouping the prepositions could be included in both of these groups. The note-taking strategies that the students used were listing different prepositions which may or may not include example sentences from the dictionary or Internet, using textual enhancement, defining the words on the list in English, and writing notes in their first language. The mental processing strategies that the students used were memorizing and reading the list, which may or may not have included saying the list out loud.

The use of strategies was different among the low-level, intermediate, and high-level students. The intermediate and low-level students took more notes while the high-level

students used more mental processing (such as memorizing or reading). Looking at Table 4.11, one can see that all five of the high-level students used mental processing while eight of the intermediate and low-level students reported taking notes. Student #10 chose not to answer this question.

Indeed, the high-level students tended to memorize the list. For example, three high-level students reported on the questionnaire that they memorized the list and one high-level student (#5) stated that she "read it several times. And I told each one out loud." Student #15 may have also memorized the list of prepositions without directly reporting this. Only one high-level student (#8) did not report memorizing the list. On the other hand, only one (#14) out of the six low-level students reported memorizing the list. For the intermediate-level students, one (#4) of the three students reported memorizing the list.

Table 4.11. Method Used to Study the List According to the Qualitative Data

Student #	Strategy	Examples
2(H)	mental	"…memorized and searching for the example sentences on the internet" (Questionnaire)
3(H)	mental	"just memorize" (Questionnaire)
5(H)	mental	"I read it several times. And I told each one out loud." (Questionnaire)
6(H)	mental and minimal note-taking	"I looked up ditionary and read the exemple and memorized." (Questionnaire) / Using arrows, he grouped the prepositions.
8(H)	mental	"I just read them and tried to understand the grammar rules with a book." (Questionnaire)
1(I)	note-taking	"copy" (Questionnaire)
4(I)	mental and note-taking	"writing them, saying and do note, just memorize them" (Questionnaire) / Grouped the prepositions according to his notes.
12(I)	note-taking	"I looked at the dictionary and wrote it down." (Questionnaire) / Grouped the prepositions according to her notes.
7(L)	note-taking	"search, listen, computer" (Questionnaire) / According to her notes, she used her first language and wrote a list of prepositions without grouping them.

Table 4.11. continued

9(L)	note-taking	"reading and writting. I tried to make rules and example sentences." (Questionnaire) / She did not group the prepositions according to her notes. She copied example sentences from the Internet according to focus group interview 2. According to her notes, she used her first language.
10(L)	----------	----------
13(L)	note-taking	"I reading sentence." / According to focus group interview 2, she wrote a story using the list of prepositions.
14(L)	mental and note-taking	"Only I memorize them." / According to his notes, he wrote example sentences and used his first language.
15(L)	note-taking	"Read." / According to focus group interview 2 and her notes, she copied example sentences from the computer and used her first language.

In contrast, all three of the intermediate students took notes, while two of these three grouped the prepositions (i.e., found patterns). The only other student that grouped the prepositions was student #6 (a high-level student); he drew arrows to group the prepositions. Student #12 (I) grouped the prepositions in this way:

greatful ---------- for
thankful ---------- for

ponder ---------- about
think ---------- about

search ----------for
look ---------- for

prepare ---------- for
study ---------- for

<u>prepare</u> = make (someone) ready or able to do or deal with sth: (schools should prepare children for life)

<u>p</u>repare = (be prepared to do sth) – be willing to do sth (I wasn't prepared to go along with that)

<u>ponder</u> = think about (sth) carefully, especially before making a decision or reaching a conclusion (I pondered the question of what clothes to wear for the occasion.) (She sat pondering over her problems.)

<u>think about</u> = consider the possibility or advantages of (a course of action) He was thinking of becoming a zoologist ("You can live how you like, but there's the children to think about")

think about = take into account or consideration when deciding on a possible action: "You can live how you like, but there's the children to think about."

search for = try to find something by seeking carefully 'He will be searching for the truth'

look for = attempt to find He has been looking for you

study for I study for learning

in (a car) I get on in the car
in (a taxi) "" taxi

in (the morning) I wake up in the morning
in (the evening) I study in the evening

Student #4 (I) grouped the following prepositions in the following manner:

grateful for	ponder about
prepare for	think about
search for	
study for	
thankful for	

Although the low-level students also used note-taking strategies, they tended to write long lists of prepositions with some example sentences without grouping the prepositions. In addition, four out of the six students who took notes in their first language were low-level students. The following is an example of a low-level student's (#9) list of prepositions:

> on 15th of August in 1769, come to my office after school, at, on, before, after, with, in, (at, on), over, above, under, below, (at, in, on), from, to, up, down, through, across, about, above, we walked about in the town, around: Let's plant trees around the house, between, among, into, out of, behind, in front of, near, along, to, for I've found it for you. He has run for a mile. like They are like brothers and sisters. from We work from Monday to Friday.

She also wrote Chinese characters on her sheet and seemed to have studied prepositions that were not on the list.

The following is an example of another low-level student's (#7) list that did not involve grouping the prepositions: "but, behind, by, with, from, into, like, up, upon, over, down, off, past, along, for, to, since, at night, at my desk, on TV, on the wall, on a bus, in a week, in the morning, in class, in spring, fall from a tree, be away from." She also wrote some Chinese characters. Her notes suggested that she studied not just the list I gave her, but many other prepositions.

An example of a low-level student (#14) using his first language can be seen here:

> Agradecido. I'm very grateful for your kindness (Amabilidad) and hospitality. AT Especific location. My brother is <u>at</u> the theatre. I'm <u>at</u> John's house. ON My favorite show is <u>on</u> TV. I'm writin <u>on</u> the board They were driving <u>on</u> the road. –Flat surerf. IN I like to study in my bedroom. I forgot my phone in my car. TO – transfer/exchange I gave the beer <u>to</u> her. FOR benefit = God. I made this lesson <u>for</u> you.

The amount of time used to study the list was also different among the low, intermediate, and high-level students. The high-level students studied the list for an average of 13 minutes. The intermediate-level students studied an average of 28.33 minutes and the low-level students studied an average of 23.33 minutes. Thus, the high-level students studied the least amount of time. Therefore, the use of strategies was different for the high, intermediate, and low-level students as well as the amount of time spent studying the list.

4.3.1.3 Transfer of Strategies

According to the students' notes, the questionnaire, and the two focus group interviews, the strategies that the students transferred from the project to the list were finding example sentences on the Internet, grouping the prepositions, creating stories using the prepositions, and using textual enhancement. Ten students transferred strategies and three did not. The three students (#1, #3, and #5) that did not transfer strategies were all intermediate or high-level students. One student (#10) did not answer how or if he studied the list.

4.3.2 Focus group interviews and questionnaire

In order to analyze the qualitative data from the two focus group interviews and the questionnaire, I used open coding based on Mackey and Gass (2005). The 23 themes that arose from the data were:

- the tests
- request for all prepositions to be on the list
- easy/hard
- request for interaction with the professor
- can memorize
- know/don't know how to use prepositions
- don't know or know meaning of the word
- can see/read
- not efficient
- explanation of each rule requested
- review of computer test requested
- liked stage 2
- time
- liked stage 1
- liked stage 3
- computer/dictionary
- interesting/fun
- example sentences/two words only
- by myself or group
- liked different ways of learning prepositions
- didn't acquire all the prepositions
- request to allow each student to write sentences
- cannot tell difference between in and on

The themes were grouped into six main categories (see Table 4.12) that pertained to what the students thought were the strengths and weaknesses of the list and the project. The data were then organized to show the strengths and weaknesses of the project and the list based on comments from the students.

Table 4.12. The Six Main Categories Developed From the Questionnaire and Interviews

Categories	Examples from the two focus group interviews and questionnaire
Information provided: These responses had to do with how much and what kind of information was given – whether they were helpful or not.	"Because some words ahh is harder, we didn't, uhh we don't know the meaning" (Student #9, focus group 2 – talking about the handouts with the rules for different prepositions).
Preferences about group work: These responses had to do with how many people should be in a group, how the group work should be divided up, or whether or not students wanted to work in a group.	"I think each student need to have opportunity to writing use preposition, without it maybe little bit boring" (Student #2, questionnaire).
Three stages of the project: These responses had to do with the different stages of the project and why the students liked or did not like the different stages.	"…I liked the stage 1: the create 16 multiple-choice items. That was good to the apply to the some sentence" (Student #6, focus group 1).
Support: These responses had to do with students requesting more support.	"I prefer a class with uhh there are more ahh interaction between professor and the students. Maybe we can get better feedback from the professor" (Student #8, focus group 1).
Opportunity to study more: These responses had to do with students taking and appreciating the opportunity to study the prepositions more (using tools such as computers and dictionaries).	"I have find a dictionary or computer the the some examples" (Student #15, focus group 1 – talking about finding example sentences for different prepositions).
Evaluations: These responses had to do with students' expressing their opinions about PBL and the list.	"It wasn't efficient" (Student #12, questionnaire – talking about the project).

4.3.2.1 The Project Technique Strengths

The project technique strengths were the input given, the opportunity to collaborate and time on task. As can be seen in Table 4.13, the perceived strengths of the project are listed and are based on the comments made by the students. For the first category *information provided*, two students commented on how the project provided information that was helpful. Student #4 (focus group 1) stated:

> Uhh, I think ahh the project is better than than than the list because the list gives you only two word. It's not like the project. It gives you the list so the information that the project gives you the sentence or the information that mean in your mind ahh memorized in your mind more, especially when you're discussing with the group and you and also you are looking to make a sentence - sentence. Ahh I think it is easy to memorize it.

Student # 13 (focus group 2) had this exchange with me:

> Susan: no. 13, which stage did you like the best?
>
> Student no. 13: Uhh, stage one.
>
> Susan: Did you feel like you learned the most from stage one?
>
> Student no. 13: Yeah.
>
> Susan: Why?
>
> Student no. 13: Uhh, because it's have the example sentence I can know what's means and how to use it.

Table 4.13. The Project Technique Strengths According to the Qualitative Data

The Project Technique Strengths
Information provided: handouts with rules for prepositions and example sentences
Group work: Group or partners helping each other by talking throughout the project
Opportunity to study more: time
Liked the different ways of learning: - stage 1- writing sentences and applying the rules made it easy to memorize - stage 2 - typing sentences into Hot Potatoes (had answers) - stage 3 - group discussing when taking the computer quiz
Evaluation: interesting/fun, a good way to learn

For the second category *group work*, seven students enjoyed group work (students #4, #6, #7, #8, #9, #14, #15) although one of these students (student #6) specified that two in a group was optimal. Student #7 (focus group 2) commented that she felt she learned the most from stage 3 and when asked why, she said: "Computer, group, together, talking." Student #9

(questionnaire) stated: “I liked to study with my partner.” In addition, student #15 (focus group 2) explained why the project was helpful in learning prepositions when she said: “Ah because I and a partner have a talking and the conversation and we have we I can know how how answer is uhh right.”

As far as the category *opportunity to study more*, student #8 (focus group 1) mentioned she had more time when she explained why she liked the project better than the list: “Uhm, I think that we have more uhh more time to – ahh - we have the time to to knew something about prepositions.”

Concerning the different stages, all of the students stated they had a favorite stage except for student #10, who did not respond to this question. There were, however, three conflicting answers: Student #4 stated he liked stage 3 on the questionnaire, but during focus group interview 1, he stated he preferred stage 1. Student #13 said she enjoyed stage 2 on the questionnaire, but in focus group interview 2, she stated she preferred stage 1. Student #7 commented that she liked stage 2 on the questionnaire, but in focus group interview 2, she stated she liked stage 3. In addition, on the questionnaire, student #5 stated she liked “taking practice quizzes” but did not like the computer quiz (a practice quiz). Student #5, however, did explain that she enjoyed stage 2 the best during the interview and also stated this on the questionnaire. Therefore, for this category (the different stages), there were four students who had conflicting answers and one student (#10) who did not answer this question, while nine students gave supporting (full) answers.

It should also be noted that there is a likelihood that there was some confusion about what the practice quizzes were. The confusion noted in the data suggests that the students might not have been able to differentiate between the pretest, posttest, and delayed posttests

and the practice quiz (stage three), which the students took on the computer (Hot Potatoes). Future research needs to ensure that the students are clear on these ideas before inviting responses.

Table 4.14 shows what the students' preferences were as far as which stage they liked the best. The focus group interviews provided the clearest data on these because they allowed for clarification of responses. Examples of students' answers are Student #6 (focus group 1) stated: "…I liked the stage 1: the create 16 multiple-choice items. That was good to the apply to the some sentence." For stage 2, student #15 (questionnaire) said "I liked the questios into Hot Potatoes because I have answer." For stage 3, student #1 (questionnaire) chose the answer "I liked taking the practice quizzes." Thus, out of the 14 students, six liked stage 3 the most, and five liked stage 1. Two students liked stage 2 and one student (#10) did not answer the question. There was no correlation between the students' preferences for the different stages and student proficiency level.

Table 4.14. Students' Preferences for the Different Stages of the Project

Stage 1	Stage 2	Stage 3
#2, #4, #6, #9, #13	#5, #15	#1, #3, #7, #8, #12, #14

For the last category *evaluation*, four students (#2, #3, #8, #14) had positive opinions about the project in general. Students #2, #3, and #8 were high-level students while student #14 was a low-level student. Therefore, the high-level students made more favorable comments than the low-level students. No comments were included that were specific to this category such as "I liked stage two." The more specific comments were included in the other

categories. Student #2 (questionnaire) commented “it was interesting and fun, a good way to learn.” Also, student #14 (questionnaire) expressed “All the project it was good for me.” Student #8 (questionnaire) stated “In my opinion, the preposition project was a good way to practice and get a better understanding about the use of prepositions in English language.”

4.3.2.2 The Project Technique Weaknesses

According to the students, the project technique weaknesses were insufficient support from the teacher, too many students in a group, lack of learning, and too-difficult input (see Table 4.15). Pertaining to the first area, lack of support, two high-level students expressed the need for more support (students #6 and #8). Student #6 (questionnaire) wrote, “Between compute group test and posttest, I wanted to review computer group test.” Student #8 (focus group 1) expressed how the project should be improved when she said, “Uhh maybe with some previous explanation of every preposition and common examples or common uses of every preposition.” Student #8 (focus group 1) also requested that the class be more dynamic when she commented, “I prefer a class with uhh there are more ahh interaction between professor and the students. Maybe we can get better feedback from the professor.”

Pertaining to the category *group work*, there were three students (students #2, #5, #6) who had opinions on how group work should be organized. Student #2 (questionnaire) wrote “I think each students need to have opportunity to writing use preposition, without it maybe little bit boring.” Student #5 (focus group 1) expressed her desire to study by herself when she stated:

> “Because when I discuss with group uhh it confuses me more and when I see a list, I can study by myself and we didn’t have any time limit uhhhh so I could memorize better than I did with group.”

Susan: So you said that there's no time limit and do you prefer working with a group or by yourself?

#5: By myself.

Student #6 had another opinion when he stated:

#6: Uhh, I have a different opinion, if the group is just two...

Susan: Un huh.

#6: it's better, but some more than three it's not good because the everybody is saying and confusing. I don't know what is the answer. What is the more accurate? I cannot say. I cannot say.

Susan: So how many were in your group?

#6: The first group I was two.

Susan: Okay.

#6: My group was two. When I the take the computer quiz, that was four - yes, that time was five.

Pertaining to the category *opportunity to learn more*, two students (#3 and #8) expressed the desire to learn more. Student #3 (questionnaire) wrote "I still not sure I can use prepositions (some of them!) correctly." Student #8 (focus group 1) stated "In some way it helped me. But I think that we need more ahh more time to learn and to know how to use every preposition."

For the category *information provided*, the low-level students expressed a concern that the words on the handouts and even the prepositions were too difficult to understand. Three low-level students (#9, #13, and #15) during focus group interview 2 shared their opinions with me in the following excerpt:

#9: Because some words ahh is harder we didn't, uhh we don't know the meaning.

Susan: Oh, you don't know the meaning.

#9: Yes.

Susan: Like... okay, you don't know meaning. You mean, with the preposition?

#13: Yes.

Susan: Like communicate –

#13: Yes.

Susan: you don't know what communicate means.

#13: Mmm

Susan: For example…

#13: Mmm

Susan: Right?

#13: Yes.

#15: Sometimes we we have uhh confused "on" and "in."

As far as evaluations about the project in general, there were comments from two students (student #10 and #12) that were negative. Student #10 did not answer the questions on the questionnaire except for the question "What did you not like about the preposition project?" Student #10 (questionnaire) answered "I didn't understand your project." In addition, student #12 answered this same question by saying "It wasn't efficient."

Concerning the three stages, two students (student #7 and #9) reported not liking the test. However, student #7 (questionnaire) had conflicting answers; she reported enjoying taking the practice quizzes, but not liking the computer test (the practice quizzes and computer test were the same thing). Student #7 also stated she liked adding the questions into

Hot Potatoes on the questionnaire, but during focus group 2, she stated: “I don’t like copy.” The only part of the project in which the students copied something was when they added the questions into Hot Potatoes; therefore, student #7 seemed to contradict herself. Student #13 (questionnaire) reported not liking stage 1 when she said: “I didn’t like creating the questions for the test.”

Table 4.15. The Project Technique Weaknesses According to the Qualitative Data

The Project Technique Weaknesses
Lack of support: - no explanation of each preposition (rule) - no review after the computer quiz (stage 3) - need more interaction with the teacher (feedback)
Group work: - Too many in a group causes confusion - Could be boring for students if they cannot participate (write sentences using prepositions)
Opportunity to study more: - Not enough time allowed - Did not master all of the prepositions
Information provided: students did not understand the meaning of the words on the handouts (A, B, & C)
Evaluation: not efficient
Three stages: - students did not like the test - students did not like to copy items into Hot Potatoes - students did not like to write sentences

4.3.2.3 The List Technique Strengths

The list technique strengths (see Table 4.16) included input provided, good for independent study, and opportunity to study more. For the first category, *information provided*, five students (#5, #6, #9, #13, #15) seemed to like the list because it was easy for them to understand and they could see it. Student #9 (focus group 2) explained why she liked the list when she said the following:

Susan: No. 9, why did you like the list better?

Student no. 9: No example sentence.

Susan: No example sentences.

Student no. 9: Yes.

Susan: You liked it better without example sentences? (Student no. 13 speaking to student no. 9 in Chinese)

Student no. 9: Because ahh if have example sentence, umm I (Student no. 13 speaking with student no. 9 in Chinese) ohh, because it is easy.

Student #13 (focus group 2) also liked the list and stated: "Umm, because it's the is it easy one. I can read it, and I know what means it. I can use this better." Student #15 (focus group 2) also explained why she liked the list better:

Student no. 15: I liked the list better.

Susan: Why did you like the list better?

Student no. 15: Ahh because I can see all the list and and I want to I want to know all the all the preposition. Yeah.

For the next category *independent work*, one student (student #5, focus group 1) commented that she liked working by herself when she said:

> Yeah, ahh because I think I'm self-learner. And it was better for me to study with list instead of study with group. Because when I discuss with group uhh it confuses me more and when I see a list, I can study by myself and we didn't have any time limit uhhhh so I could memorize better than I did with group.

Pertaining to the category *opportunity to study more*, there were six students (students #5, #6, #7, #9, #13, #15), who expressed that they enjoyed having more time or used a dictionary/computer to learn more. Student #5 (focus group 1) commented about time when she said "when I see a list, I can study by myself and we didn't have any time limit uhhhh so

I could memorize better than I did with group." Student #6 (focus group 1) stated "I prefer the list of preposition about the accuracy because I had the time to look up the dictionary that time." In addition, student #15 shared:

> Susan: So, did you make your own sentence no. 15 or did you look it up on the computer or in a dictionary?
>
> #15: Umm, yeah, I have find a dictionary or computer the the some examples.

Table 4.16. The List Technique Strengths According to the Qualitative Data

The List Technique Strengths
Information provided: only two words given - easy to understand, could see and read the list
Independent work: Could work independently (self-learner)
Opportunity to study more: - dictionary - found meaning - computer - found example sentences - no time limit - could write a story using the prepositions

4.3.2.4 The List Technique Weaknesses

The list technique weaknesses were identified as lack of input, no group work, and not much work involved (see Table 4.17). Pertaining to lack of input, three students expressed that not much information was given. Student #4 (focus group 1), when asked why he did not like the list, responded:

> Because it is just just give you two words only. Yeah… it is not full sentence and you can uhh it's it's give you the the the the the meaning in your mind or the rule the rule or…. Uhh, I think ahh the project is better than than than the list because the list gives you only two word. It's not like the project.

Student #14 (focus group 1) also stated something similar after he had expressed liking the project better:

> Susan: Why was the project better?

Student no. 14: Because the the list – it's not the it's only mmm some words. It's not too much.

Susan: Can you repeat that one more time?

Student no. 14: So the the the list the preposition it's not too much so only couples words.

Student #1 (focus group 1) agreed that more information would be better when she said:

Student no. 1: and I know to read but in the list is one list, and I I don't know what is...

Susan: Okay - So you said you made the sentence. That means if you made - if there was a sentence on the list, would that be better?

Student no. 1: Yeah.

For the category *group work*, one student (#8, focus group 1) mentioned that she does not like to work by herself when she commented: "I didn't study the list because I don't want to to study by myself, so I think that the project was better."

For the last category *opportunity to study more*, one student (#15, questionnaire) stated the following: "I want all preposition on the list." In addition, student #14 (focus group 1) said this about the list: "Because the list it was short… it's not too much work. So the project it was better for me."

Table 4.17. The List Technique Weaknesses According to the Qualitative Data

The List Technique Weaknesses
Information provided: only two words given – not much information
Group work: some students did not like to work independently
Opportunity to study more: - all prepositions were not on the list - not much work involved

4.4 Chapter Summary

The key results from the quantitative and qualitative analyses were summarized and presented in Tables 4.18 and 4.19 which show the main findings from this study. The percentages in Table 4.18 and 4.19 indicate what percent the students' scores rose or fell from the pretest. When conflicting information was reported, the chart shows what was said during the interviews in the table below rather than what he or she wrote on the questionnaire. For example if student x stated she preferred the project better on the questionnaire and then said she preferred the list during the interview, the table shows she preferred the list. These were reported this way because the difference between the list and project were explained before the interviews and their preferences could be verified by talking with the students in the interviews. In addition, if a student wrote on the questionnaire that he or she liked stage 3 best, but during the interview said he or she liked stage 2 best, the table reports what he or she said during the interview. Chapter five will address these key results and explain why they may have occurred.

Chapter four has explained the results of the quantitative and qualitative analyses and concludes with two tables summarizing the key results. The next chapter will provide a discussion of the results as well as the limitations and implications for future research.

Table 4.18. Summary of the Results (1)

Student	#1 (I)	#2 (H)	#3 (H)	#4 (I)	#5 (H)	#6 (H)	#7 (L)
Preference:	P	P	Both	P	L	Both	L
Project (Posttest)	+17%	+25%	+9%	+25%	+17%	+33%	-9%
Project (Delayed)	+17%	+25%	+17%	+17%	+25%	+8%	-17%
List (Posttest)	+0%	+0%(100 % on pretest)	+25%	+50%	+0%(100% on pretest)	+0%(100 % on pretest)	-75%
List (Delayed)	+25%	+0%(100 % on pretest)	+0%	+0%	+0%(100% on pretest)	+0%(100 % on pretest)	-50%
Stage Preferred	3	1	3	3	2	1	3
Stage 1 (Posttest)	+0%	+50%	+0%	+50%	+0%(100% on pretest)	+25%	+0%
Stage 1 (Delayed)	+25%	+50%	+75%	+0%	+0%(100% on pretest)	+25%	+25%
Stage 2 (Posttest)	+0%	+0%	+0%	+25%	+25%	+25%	+25%
Stage 2 (Delayed)	+0%	+0%	-25%	+25%	+50%	+0%	-25%
Stage 3 (Posttest)	+50%	+25%	+25%	+0%	+25%	+50%	-50%
Stage 3 (Delayed)	+25%	+25%	+0%	+25%	+25%	+0%	-50%
Method used to study the list	copy	M / ESI	M	MR / copy M / took notes / S /	R / S	MR / M / ESI	ESI / D

Note. MR = Made rules, M = Memorized, ESI = Found example sentences on the Internet, R = Read list, D = Used dictionary, H = Highlighted certain words with a red pen, C = created a story, S = Said the list out loud.

Table 4.19. Summary of the Results (2)

Student	#8 (H)	#9 (L)	#10 (L)	#12(I)	#13 (L)	#14 (L)	#15 (L)
Preference:	P	Both	-------	Both	L	P	L
Project (Posttest)	+8%	+25%	-8%	+25%	+8%	+17%	+9%
Project (Delayed)	+0%	+17%	+0%	+0%	+0%	-8%	-16%
List (Posttest)	+50%	+25%	+0% (100% on pretest)	+25%	+25%	+0%	+50%
List (Delayed)	+50%	+0%	-50%	+25%	+50%	+0%	-25%
Stage Preferred	3	1	--------	3	1	3	2
Stage 1 (Posttest)	+0%	+25%	+0%	+25%	+0%	+0%	+0%
Stage 1 (Delayed)	+0%	+50%	-25%	+25%	+0%	-25%	-25%
Stage 2 (Posttest)	+0% (100% on pretest)	-25%	+0%	+25%	+25%	+25%	+0%
Stage 2 (Delayed)	+0% (100% on pretest)	-25%	+0%	+0%	+25%	+0%	-50%
Stage 3 (Posttest)	+25%	+75%	-25%	+25%	+0%	+25%	+25%
Stage 3 (Delayed)	+0%	+25%	+25%	-25%	-25%	+0%	+25%
Method used to study the list	MR / R	Copy / MR / ESI/ D/ R	--------	D / MR / H / Found example sentences	R / C / D	M / MR / D / Found example sentences	R / ESI / D

Note. MR = Made rules, M = Memorized, ESI = Found example sentences on the Internet, R = Read list, D = Used dictionary, H = Highlighted certain words with a red pen, C = created a story, S = Said the list out loud.

CHAPTER 5. DISCUSSION/CONCLUSION

5.1 Chapter Overview

Chapter four described the results of the quantitative and qualitative analyses for the current study. This chapter begins by addressing the five research questions for this study as well as other interesting findings that emerged. It will then discuss the implications for practice as well as future research and limitations of this case study.

Research Question 1a: Do adult ESL students improve their accuracy in their use of prepositions after participating in a PBL activity in which they create multiple-choice quizzes using a quiz-making program?

In response to the PBL activity, students' scores significantly improved between the pretest and posttest, which suggests that they improved in their use of prepositions in a given context. One reason why the students improved from the pretest to the posttest may be because enhanced input, as described by DeRidder, 2002; Izumi, 2002; Khatib & Safari, 2013; Lee, 2007; Leeman, Arteagoitia, Fridman, & Doughty, 1995, in combination with other learning strategies, and explicit instruction used along with production practice (as noted in Felix-Brasdefer, 2008; Lyster, 1994) has been shown to help students improve in their proficiency of the target form.

Despite observed improvement between the pretest and the posttest, there was a decline in the scores for the delayed posttest, and there was no effect between the pretest and delayed posttest. This suggests that while the PBL approach appears to be an effective technique, one time application in not sufficient for continued improvement. Perhaps more

projects that are structured would be beneficial and conducive to the acquisition of the target form: prepositions.

When looking at only the intermediate and high-level students' scores with descriptive statistics, there was a big gain between the pretest and posttest as well as between the pretest and delayed posttest. The low-level students, however, had a small gain between the pretest and posttest and a loss in scores from the pretest to the delayed posttest. This suggests that the PBL activity may have been more appropriate for the intermediate and high-level students. The intermediate and high-level students may have performed better than the low-level students because they could understand the vocabulary on the handouts in which they received explicit instruction. In contrast, the low-level students may not have performed as well because the vocabulary on the handouts (explicit instruction) was too difficult for the low-level students to learn from, as some had mentioned in focus group interview 2. In Wible, Kuo, Chien, & Wang, 2002, Chien's study found that students in Taiwan who learned English vocabulary by using a corpus performed worse on the posttest after they were given unfiltered example sentences. The group that got easier-to-understand example sentences, however, did better. In addition, in Chien's study, the group that did not get any example sentences did better than the group that received "unfiltered examples" on the posttest (p. 148). This study shows that if the input is difficult to understand, students may do worse with the input than if they have no input at all.

In addition, in focus group interview 2, student #15 (a low-level student) mentioned: "Sometime we we have uhh confused 'on' and 'in'." Some of the low-level students seemed to have trouble with understanding the difference or meaning of the different prepositions

such as “in” and “on.” The low-level students may have benefitted from an explanation of the meaning of different prepositions of place such as “in” and “on.”

This PBL activity seemed to be more beneficial to intermediate and high-level students than low-level students. Therefore, instructors need to use caution when using structured PBL with low-level students.

Research Question 1b: At which stage in the project do students appear to make the most improvement?

Because of the limitation of the design of the current study, inferential statistics could not be used to compare the three stages. The limitation occurred because all of the students received the three treatments (i.e., the three stages); therefore, it is likely that there might have been a spill-over effect. In other words, inferential statistics could not be used to compare stage one with stage two because stage two might have been influenced by stage one, and stage three might have been influenced by stages one and two.

However, a one-way repeated measures ANOVA test in SPSS was run for stage one to examine if the gains or losses were statistically significant. That test showed that there was no significant difference between the scores on the pretest, posttest, and delayed posttest. However, the pairwise comparisons showed that students’ gains from the pretest to the posttest for stage one were statistically significant.

In addition, descriptive statistics were also used to compare the three stages. The results showed that stage three had the biggest gain (20%) between the pretest and posttest. Stage one also had a big gain (13%) between the pretest and posttest while stage two had a gain of 11%. These are results that the average teacher would be attending to if he or she

were to grade the students' performance on their use of prepositions in the classroom. In other words, descriptive statistics would be used rather than inferential statistics.

Stage one had a gain of 13% between the pretest and the posttest. For the delayed posttest, stage one was the only stage in which there was a gain between the posttest and delayed posttest (2%). Thus, there was a gain of 15% between the pretest and delayed posttest for stage one. Stage three had a gain of 20% between the pretest and the posttest. The students' scores for stage three, however, fell from the posttest to the delayed posttest by 14%. Therefore, there was gain of only 6% between the pretest and delayed posttest for stage three. For stage two, there was a gain of 11% between the pretest and the posttest. However, the students' scores fell by 12% between the posttest and the delayed posttest, resulting in a loss of 1% between the pretest and the delayed posttest.

The results of the descriptive statistics for the three stages suggest that stage one was the most effective in helping students learn how to use prepositions accurately followed by stage three and then stage two. The students' scores for stage one even rose from the posttest to the delayed posttest. Laufer and Hulstijn's notion of Involvement Load (2001) can be used to shed light on why the students in the current study may have performed well in stage one. In their article, Laufer and Hulstijn (2001) wrote about using involvement load in tasks in which second language vocabulary is learned incidentally. The authors asserted that involvement load, the result of adding together need, search, and evaluation, can predict which tasks will facilitate retention of vocabulary words better. Need pertains to the student's desire to learn. If the student fulfills a task because he or she decides to do it, the need is strong (++). However, if the student is asked by his or her teacher to fulfill a task, the need is moderate (+). Search involves searching for the meaning of a word. If the meaning of the

word is supplied, search is not needed (-). However, if the meaning is not given, search is needed (+). Search can involve looking up the meaning or asking the teacher for the meaning. Evaluation involves choosing between different meanings (from a dictionary), or choosing collocations when writing. If a task requires one to write a vocabulary word in an original sentence, evaluation would be strong (++), but if there were a fill-in-the-blank exercise for the vocabulary word, evaluation would be moderate (+).

The involvement load for stage one of my study was need (+), search (+), and evaluation (++). The involvement load for stage two was need (+), search (-), and evaluation (-). Finally stage three had an involvement load of need (+), search (+), and evaluation (+). Thus it could be argued that stage one had the highest involvement load followed by stage three then stage two. This may explain why the students' scores for stage one rose between the posttest and delayed posttest. That is, the data suggest that students were able to retain what they learned due to high involvement load. This may also explain why students performed better on stage one than stage three on the delayed posttest and why the students did not do as well on stage two. Although the students made substantial improvements in their scores for both stages 1 and 3, only the scores for stage 1 appear to be lasting in this case study.

The students also seemed to be involved or engaged in the project. They wanted to do another project again. Therefore, this leads us to ask if a higher involvement load might be considered engagement with the task, and thus could be connected with more positive motivation to do PBL of this type.

Stage one seemed to be the most effective stage due to its use of high involvement load. Therefore, when designing a PBL activity, involvement load may need to be considered in order to help students learn and for the improvement to be sustained.

Research Question 2: Do adult ESL students improve their accuracy in their use of prepositions after studying a list of prepositions?

After studying the list of prepositions, the students' scores improved from the pretest to the posttest, which suggests that students were able to improve in their use of prepositions in a given context after studying independently. The students' improvement on the posttest may have been because they used the strategies from the project to study the list. Indeed, the students reported that they transferred strategies from the project to the list. However, despite the improvement between the pretest and the posttest, the students' scores fell between the posttest and the delayed posttest. This suggests that while studying the list independently appears to be conducive in helping students use prepositions more accurately, more time needs to be given for the students to study the list of prepositions in order for improvement to continue.

For the intermediate and high-level students, there was a big gain from the pretest to the posttest and from the pretest to the delayed posttest. In contrast, the low-level students had a small average gain from the pretest to the posttest and an average loss from the pretest to the delayed posttest.

One reason the intermediate and high-level students' scores may have increased between the pretest and the posttest after studying the list could be that they understood the vocabulary on the handouts better. The intermediate and high-level students could focus on memorizing the list (i.e., they did not have to figure out the meanings of the vocabulary

words). Based on the students' notes and the questionnaire on how they studied the list, five of the eight intermediate and high-level students memorized the list.

On the other hand, the low-level students during focus group interview 2 stated that they could not understand the vocabulary on the handouts or the prepositions themselves. Their notes showed that they tended to list different prepositions as if they were learning what the different prepositions were. The low-level students were not free to memorize the list but rather seemed to spend their time familiarizing themselves with the different prepositions and meanings of the vocabulary that went along with the prepositions. Indeed, the low-level students may not have had enough understanding to memorize the list.

Studying the list seemed to facilitate the learning of prepositions for the intermediate and high-level students. Teachers, however, need to use caution when asking low-level students to study a list of prepositions.

Research Question 3: Which method facilitates more accuracy in the use of prepositions: the project or studying a list of prepositions?

One goal for this research study was to investigate if the students would use the strategies from the project for the list. The result was that they did use the strategies, but the study design made it impossible to compare the groups using inferential statistics. In other words, the list was influenced by the project so that the list was really a mixture of the list plus the project. Thus, only descriptive statistics could be used to compare the project with the list.

For the posttest, the students' performance for the items from the project was an increase of 14% and this increase was statistically significant. For the list, the students' scores went up by 12%. Therefore, for the posttest, the project was similar to the list. The

improvement for both the project and the list for the posttest may be due to the fact that the students transferred the learning strategies that they learned from the project to the list.

For the delayed posttest, however, there was a not-statistically-significant 6% increase for the project from the pretest to the delayed posttest. There was also only a 2% increase for the list for the delayed posttest. Thus, the students performed slightly better on the project than the list.

Research Question 4: What do the adult ESL students think are the strengths and weaknesses for the project and the list?

Overall, 10 students enjoyed the project (three students stated they enjoyed the project "a little" on the questionnaire) and 11 students reported on the questionnaire that they would like to do another project in the future. This suggests that the students were motivated to do the project. The reason the students seemed to enjoy the project may have been because of the type of input provided and because it involved group work. Indeed, two students enjoyed the project because of the information provided in the project was helpful (e.g., example sentences) to them. In addition, seven out of the 14 students in the current study reported enjoying working in a group (although student #6 mentioned that he preferred to work in a group of only two students). Therefore, when designing a project for language learners, teachers may want to provide example sentences and rules for the grammar point that they are teaching, as well as provide opportunities for the students to collaborate.

As far as preferences, the intermediate and high-level students favored the project while the low-level students seemed to favor the list, despite having problems with it. The findings suggest that there was no correlation between the students' preferences and the students' performance. This PBL activity appears to have motivated the intermediate and

high-level students, but not the low-level students. It appears to have been too difficult for the low-level students. Therefore, caution needs to be taken when using this type of PBL with low-level students.

As noted, there may have been some confusion about what the project included (e.g., students may have thought the project included studying the list and taking the pretest, posttest, and delayed posttest); however, the students in general did report that they enjoyed the project and were motivated to participate in a future project. This may be due to the fact that the students were studying prepositions (grammar), something they thought was important to learn. Previous studies (e.g., Beckett, 1999; Eyring, 1989) mentioned that students who were learning a language and had participated in projects had requested to learn grammar.

The students reported that the strengths of the project were input provided and the opportunity to work in a group. The students also liked the different stages of the project. Five students liked stage one, two liked stage two, and six liked stage three. Student #10 did not report which stage he liked the best.

In contrast, the strengths of the list were the input was easy to understand and accessible and unlimited time was given. Five students preferred the list because the input that was provided was easy to understand and they could "see" it. The list could be taken home to study, but the handouts with the preposition "rules" could not because of the design of the study, which sought to control the amount of time the students spent on the project. Six students also enjoyed having the opportunity to study more (e.g., use a dictionary or computer). This suggests that for the PBL activity that students may enjoy being able to take the handouts with the "rules" for prepositions home to study. Teachers could have the

students do the PBL activity at school, but then allow students to take the materials home to study to reinforce what they learned in class.

The weaknesses of the project were insufficient support from the teacher, too many students in a group, and input that was difficult to understand. Two students #6 and #8 (both high-level students) mentioned that they would like more interaction or support from the teacher. One student reported that there were too many students in a group while another student expressed the desire for each student to have the opportunity to create multiple-choice items. Three low-level students reported that the input was too difficult to understand.

The students' comments suggest that the scaffolding used in the current study was not enough. Although the students were provided structure or scaffolding (as detailed by De Guerrero & Villamil, 2000 and discussed in Chapter 1) in the form of step-by-step directions to help them enter another group's multiple-choice items into Hot Potatoes, and the researcher was also available to answer any questions students might have had, this did not seem to be enough. More scaffolding was called for. This suggests that teachers need to provide a variety of regular support by perhaps going over the vocabulary with the students at the beginning and allowing time for students to ask questions about the handout as well as follow up the project by having a discussion. In addition, smaller groups may be more conducive to helping students be more involved and participate more so that they can learn how to use prepositions more accurately.

The weaknesses for the list were lack of input, lack of "work" involved, no opportunity to collaborate in a group. Three students wanted more information on the list or more "work" involved with the list while one student reported that she wanted to work in a

group. This suggests when asking students to study independently, providing input which includes example sentences and "rules" may be beneficial to the students.

Research Question 5: Do students transfer strategies to a new context after participating in a CALL project on prepositions?

The students transferred the strategies from the project to the list, which they appeared to study independently outside of the PBL unit. This provided evidence that the students were structuring their own learning, an idea that supports Dewey's theory of experiential learning, which states that if students are provided quality experiences, they will be motivated to pursue future learning. Indeed, the students took the strategies they learned from the project and applied these same strategies to a future learning situation (the list). This suggests that the students were motivated to use the strategies that were introduced to them during the project for what they may have deemed a different learning context; in the end, the project seemed to encourage students to pursue further learning.

This transfer of strategies in the current study also supports the theory suggested by Bransford, Brown, and Cocking (2000) which stated that students need to learn the topic well in the original context, have motivation to learn, and need to obtain understanding rather than simply memorizing the material for transfer to occur. The results and procedures showed that the students were able to achieve all of these conditions. First, the students significantly improved between the pretest and posttest during the project and therefore appeared to have learned the topic well. Second, the researcher provided a way for the students to be motivated to learn by having the students create a multiple-choice quiz in Hot Potatoes and then share this quiz with another group. Finally, some of the students showed that they understood the

"rules" for prepositions by grouping them according to patterns. Therefore, it appears that these conditions were conducive for transfer of strategies to occur in the current study.

What is also interesting is that three out of the eight intermediate and high-level students did not transfer strategies from the project to the list. Student #1 simply copied the list while student #3 reported only memorizing the list and student #5 stated she read the list and said it out loud. The reason why the intermediate and high-level students did not transfer strategies may be because they did not need to use strategies to learn the prepositions whereas the low-level students found it necessary to use them. The findings from this case study support those of Oxford, Cho, Leung, and Kim's (2004) study. Oxford, Cho, Leung and Kim (2004) found that the high-level students did not use as many strategies as the low-level students since they were more proficient and therefore did not need to rely them as much.

5.2 Implications for Instruction and Further Research

Teachers need to exercise caution when using structured PBL with low-level learners. The data showed that low-level students did not do as well on the project as the intermediate and high-level students and that the low-level students preferred the list. The low-level students mentioned that they did not understand the vocabulary. Perhaps other modalities such as the use of visuals could be effective in helping low-level learners.

This case study showed that motivated students were using whatever was made available to them (i.e., the students transferred the "knowledge" or strategies from the project to the list); this suggests teachers who are using technological innovations in project-based teaching and learning would do well to offer a variety of resources.

Projects are a huge part of education and related to content-based instruction. This case study showed the projects can be used with a focus on form. Therefore, programs that are meaning-based and use form-focused projects provide the opportunity to improve students' grammar.

This case study supports the idea that project-based work that is structured is effective. However, even more structure could be used. Student responses indicate that even more structure or interaction with the teacher may provide for more learning and enjoyment for the students. For example, to provide more structure, the teacher could discuss the handouts before having the students write their 16 multiple-choice items. The lower-level students mentioned that they could not understand the meaning of the words that collocated with the prepositions on the handouts. Thus, an explanation of these words (e.g., ponder/think about or hunger/long for) may facilitate even more learning. In addition, allowing students to ask questions about the handout before they create the multiple-choice items may clarify any questions they may have about the rules for prepositions.

Noticing in combination with explicit instruction and production practice appeared to facilitate the learning of prepositions. The data showed that the students' scores improved from the pretest to the posttest for the project, demonstrating that they learned how to use prepositions in a given context.

Because students in the current study were experts at using all of the materials and strategies provided and there might have been a spill-over effect from the project to the list, it is difficult to control for these factors. However, the idea of a mixed-methods approach allows for learning gains to be seen from the perspective of a teacher and allows researchers the freedom to explore the various strategies students use to make a project a success.

Additional research needs to be conducted to find out if a technology-infused project teaching prepositions is effective with other students in other contexts.

Because the low-level students may have had difficulty in participating in and understanding the questions on the questionnaire and focus group interviews, using the students' first languages in these situations may be beneficial in collecting data about students' opinions about the project and the list. In addition, for some of the students, there may have been some confusion about what the project entailed. An explanation and a visual at the beginning of future studies explaining the difference between the list and the project and the pretest, posttest, and delayed posttest could alleviate some of this confusion.

5.3 Limitations

One limitation was that there were only four items on the pre-, post-, and delayed posttests for the list, stage one, stage two and stage three. Therefore, it was impossible for students to improve their scores if they had correctly answered the four questions on the list, stage one, stage two, or stage three. Therefore, the pre-, post-, and delayed posttests may not have captured whether students improved in their use of prepositions on the list, stage one, stage two, and stage three. Another limitation was that because the present study was a case study, great caution should be taken when attempting to generalize the results to other English as a second language learners, especially because there were only a few participants (Mackey & Gass, 2005). In addition, this study had the same participants receiving both treatments (the project and the list). Thus, there may have been a spill-over effect. Therefore, it was difficult to compare the two treatments using inferential statistics. Future studies may have two different groups: one for the control (the list) group and one for the experimental (the project) group to overcome this limitation.

Concerning the questionnaire and focus group interviews, Mackey and Gass (2005) stated, students may answer the questionnaire about their opinions about the CALL project and respond to the focus group interviews "by giving the answers or responses they think are expected" (p. 114). This possible effect may have been intensified since they were in the role of student to my teacher role, even though this project was not part of their regular course, and they did not receive a grade for it. They may have exaggerated their answers or answered the questions in a way that they thought that I would want them to answer despite my deliberately staying neutral on the idea of a project versus a list. For these reasons among others, caution must be taken in interpreting the results of this study.

5.4 Final Conclusion

I conducted this case study because I was interested in exploring whether students' interest in and motivation for learning about prepositions, a very grammatically based topic, would be piqued through using a CALL project-based approach, and whether learning could be enhanced using this approach. Knowing from experience that prepositions can be difficult to acquire, it was my desire to create and provide a CALL project that would motivate the students, teach them grammar explicitly, and encourage them to pursue autonomous learning. In my journey, I discovered that overall the CALL project was a successful way to help the students learn how to use prepositions. Students appeared to be much more motivated by the project than I had anticipated. Moreover, through the CALL project, the students appeared to have learned how to better structure their own learning of prepositions and thus became more autonomous as learners. It is my hope that future teachers and researchers can benefit from this single case study, so that they can have a better understanding of what may facilitate the teaching of prepositions and thus help students of English learn this target form.

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APPENDIX A

HANDOUTS A, B, AND C

The rules for the following prepositions were taken with minor changes from the following resources: *Collins COBUILD Grammar Patterns 1: Verbs* edited by Gill Francis, Susan Hunston, and Elizabeth Manning (1996), Common Preposition Combinations by Jennifer Mawhorter (2011) from http://media.cst.edu/uploads/genericfile/wc-common-preposition-combinations.pdf , Rick Shur's (2000) Rules for Prepositions from http://ESLprof .com/handouts/Info/preprule.doc, and *Basic English Grammar (3rd Ed.)* Betty Schrampfer Azar and Stacy A. Hagen (2006).

Handout A

1) Words that are about **facial expressions** and use the preposition "**AT**":

[winked **AT** -- frowned **AT** -- smiled **AT**]

I winked **at** the little girl.
She frowned **at** me.

2) Words that are about **depending on someone or something** and use the preposition "**ON**":

[depend **ON** -- rely **ON**]

You can depend **on** me.
He relied **on** his friend to help him.

3) Words that are about **public transportation** (**bus, train, subway, plane, jet, ship**) and use the preposition "**ON**":

[**ON** the bus -- **ON** the train -- **ON** the subway -- **ON** a plane -- **ON** a jet --**ON** a ship]

I rode **on** the bus from St. Paul to Chicago.
He sat **on** the plane and read a newspaper.

4) Words that are about things **in a room or anything smaller** and use the preposition "**IN**":
[**IN** the closet -- **IN** a drawer -- **IN** a cup -- **IN** a bowl -- **IN** a glass -- **IN** your mouth -- ideas **IN** your head]

Look **in** the closet, and you will find a red dress that I bought for you.
What's **in** your glass?

5) Words that are about being **capable** and use the preposition "**OF**":

[capable **OF** -- incapable **OF**]

She's capable **of** winning the contest.
Mary is incapable **of** speaking eloquently in front of a large audience.

6) Words that are about being **excellent at** something and use the preposition "**AT**":

[good **At** -- excellent **AT**]

He's excellent **at** math.
They're good **at** sports.

7) Words that are about being **happy** and use the preposition **"ABOUT"**:

[happy **ABOUT** -- excited **ABOUT**]

He's excited **about** getting married.
She's happy **about** moving to California.

8) Words that are about **places in a city** and use the preposition "**AT**":

[**AT** the park -- **AT** the grocery store -- **AT** the bookstore -- **AT** the gas station **AT** the library]

They're **at** the library.
The kids are **at** the bookstore.

Handout B

1) Words that are about being **accustomed to** or **used to** something and use the preposition "**TO**":

[accustomed **TO** -- used **TO**]

Are you used **to** waking up at 4:00am?
They're accustomed **to** living in cold weather.

2) Words that are about being **worried** and use the preposition "**ABOUT":**

[anxious **ABOUT** -- nervous **ABOUT** -- upset **ABOUT** -- worried **ABOUT** --unhappy **ABOUT** -- sad **ABOUT**]

I'm worried **about** the test.
What are you upset **about**?

3) Words that are about being **terrible at** something and use the preposition "**AT**":

[bad **At** -- terrible **AT**]

He's terrible **at** cooking.
They're bad **at** math.

4) Words that are about a **month, season, year, or century** and use the preposition "**IN**":

[**IN** November -- **IN** the summer -- **IN** 1987 -- **IN** the 20th century]

My birthday is **in** January.
We love to go to the acquatic center **in** the summer.

5) Words that are about **concentrating** and use the preposition "**ON**":

[concentrate **ON** -- focus **ON]**

I tried to focus **on** driving while everyone else was talking.
It was difficult to concentrate **on** my assignment with the TV on.

6) Words that are for **measurements** in cooking and use the preposition "**OF**":

[a cup **OF** sugar -- a teaspoon **OF** olive oil -- a cup **OF** rice -- a pound **OF** hamburger]

You will need one cup **of** sugar and one cup **of** flour for this recipe.
Please measure out a teaspoon **of** vegetable oil.

7) Words that are about **moving** from point A **TO** point B and use the preposition "**TO**":

[go **TO** school -- drive **TO** work -- move **TO** -- take a trip **TO** Boston -- take your kids **TO** school -- fly **TO** London -- walk **TO** the library -- bring your dog **TO** the vet]

I went **to** school yesterday.
I walked **to** work yesterday.

8) Words that are about being **hungry** and use the preposition "**FOR**":

[hungry **FOR** -- long **FOR**]

I'm hungry **for** a salad.
He's longing **for** a place that he can call home.

Handout C

1) Words that are about an **area** (**city, state, country, continent**) and use the preposition "**IN**":

[**IN** Des Moines -- **IN** Florida -- **IN** Korea -- **IN** North America]

She lives **in** Albany, New York.
He stayed with his friend **in** California for three months.

2) Words that are about a person **accidentally hitting someone or something else** and use the preposition "**INTO**":

[bump **INTO** -- crash **INTO**]

He was texting while driving and his car crashed **into** a tree.
I accidentally bumped **into** the wall.

3) Words that are about **rooms** in a building and use the preposition "**IN**":

[**IN** a room -- **IN** class -- **IN** jail/prison]

She's **in** her bedroom.
He stole something valuable from a store, and now he's **in** jail.

4) Words that are about a **day** and use the preposition "**ON**":

[**ON** Monday -- **ON** Christmas Day]

He likes to take a nap **on** Sunday.
She was born **on** Christmas Eve.

5) Words that are about **borrowing** and use the preposition "**FROM"**:

[borrow **FROM** -- quote **FROM**]

She borrowed some money **from** me.
He quoted **from** a famous book.

6) Words that are about being **satisfied** and use the preposition "**WITH**":

[dissatisfied **WITH** -- satisfied **WITH**]

The teacher was dissatisfied **with** the student's work.
I was satisfied **with** my effort.

7) Words that are about anything like **a line** and use the preposition "**ON**":

[**ON** the coast -- stand **ON** the line]

Please sign your name **on** the line.
I would like to live **on** the coast.

8) Words that are about **agreeing** or **disagreeing** and use the preposition "**WITH**":

[agree **WITH** -- disagree **WITH**]

She agreed **with** me.
Why do you always disagree **with** me?

APPENDIX B

FOCUS GROUP QUESTIONS

(1) Do you think studying the list of prepositions helped you to use prepositions more accurately?

(2) Why do you think you learned by studying the list?

(3) Did you like the list?

(4) Why did you like the list?

(5) Why did you not like the list?

(6) Did you like the project?

(7) Did you think the project was helpful to you to learn prepositions?

(8) Why was the project helpful to you to learn prepositions?

(9) Why was the project not helpful to you to learn prepositions?

(10) Why did you like the project?

(11) Why was the project bad?

(12) Why was the project hard?

(13) If you could change the list, how would you change it?

(14) If you could change the project, how would you change it?

(15) Do you prefer to work in a group or by yourself?

(16) Which method did you like better?

(17) Why did you prefer one method over the other?

(18) Which stage did you like the best? Why?

(19) Did you like stage 1 of the project better or the list?

(20) Did you make sentences with the list?

(21) Why do you think you learned the most from stage 1?

(22) Why do you think you learned the most from stage 3?

(23) Why was the list okay and not the handout?

(24) If you did not know the word on the list, raise your hand if you looked up the meaning.

APPENDIX C

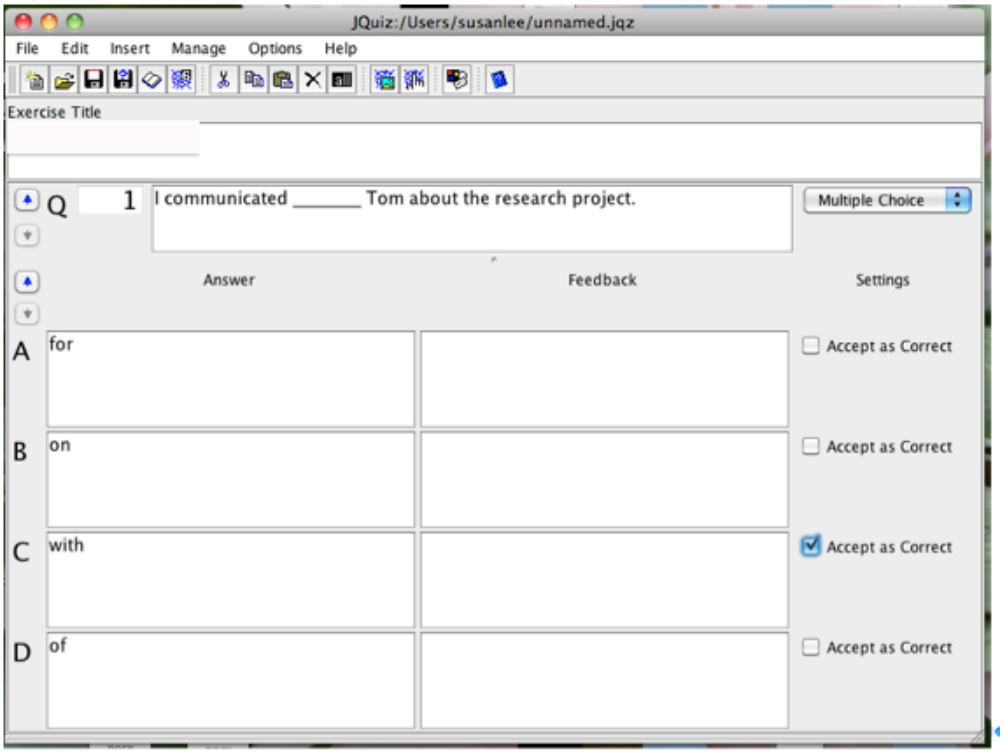
DIRECTIONS FOR HOT POTATOES

1) Go to http://hotpot.uvic.ca/ and download Hot Potatoes. Make sure you drag all of the contents of the folder for Hot Potatoes into your Applications folder on your computer.

2) You should see the image below after you download the program:

3) Click on JQuiz.

4) If the program asks you to register, go ahead and register and type in your first and last name.



5) Under Exercise Title: Type in your names. For example: Quiz

6) Next to Q 1: Type in your sentence. For example: I communicated _____ Tom about the research project.

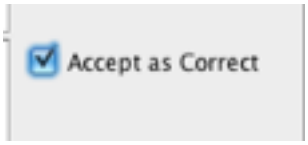
7) Next to A: Type in a preposition. For example: for

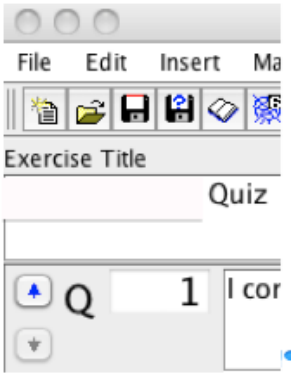
8) Next to B: Type in another preposition. For example: on

9) Next to C: Type in another preposition. For example: with

10) Next to D: Type in another preposition. For example: of

11) **Remember to click "Accept as Correct" (on the right side of the screen) for the answer that is correct.[answer C: with]





12) Next click the blue arrow next to Q 1.

13) Write the next sentence next to Q 2 and the four choices.

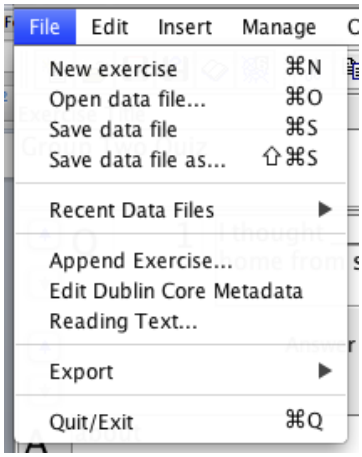
14) **Remember to **Remember to click "Accept as Correct" (on the right side of the screen) for the answer that is correct.

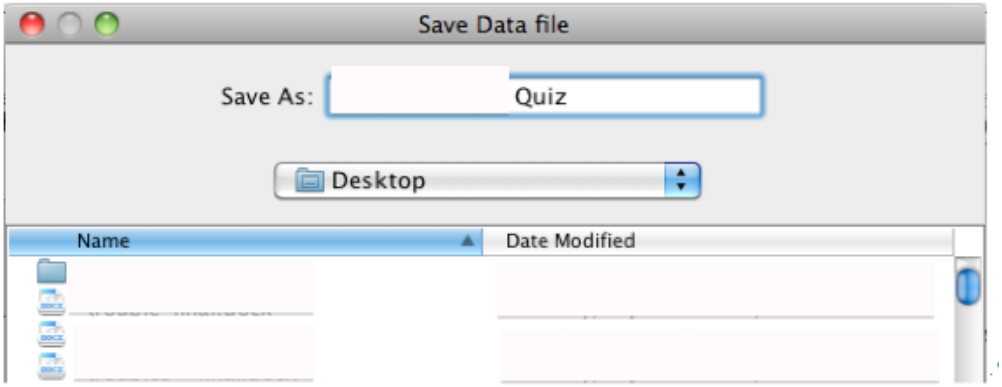
15) Next click the blue arrow next to Q 2.

16) Write the next sentence next to Q 3 and the four choices.

17) **Remember to **Remember to click "Accept as Correct" (on the right side of the screen) for the answer that is correct. If you do NOT DO THIS STEP, the test item will not be saved.

18) When you are finished entering all 16-test items, click on File.
Then click on "**Save data file as**".. (see picture below)

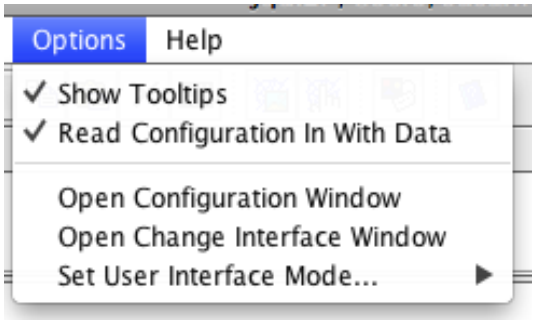




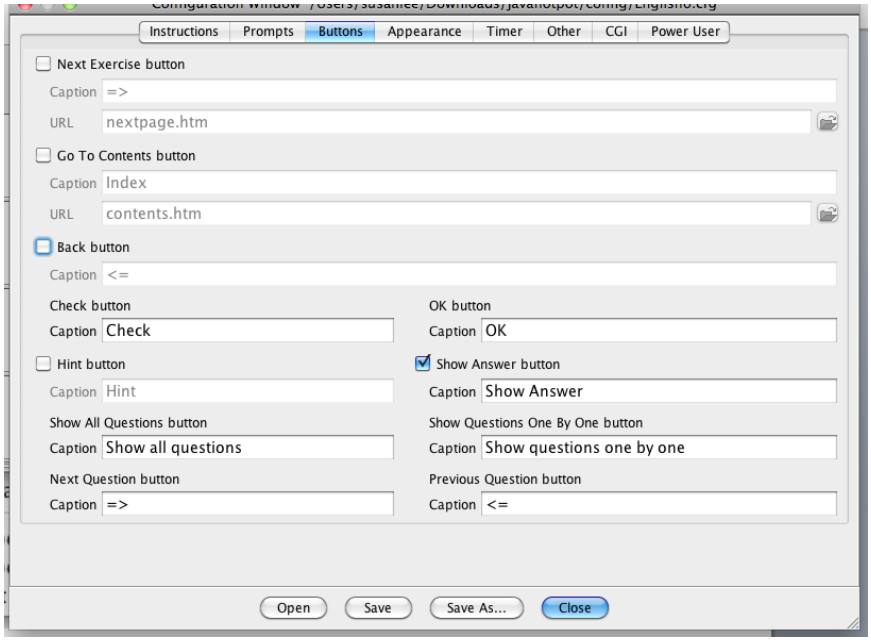
19) You will see the window above. Make sure you save the file to the Desktop! In the Save As box, type in your names. For example: Save As Quiz

20) Then click on Save at the bottom of your screen.

21) See picture below and click on Options. Then select Open Configuration Window.

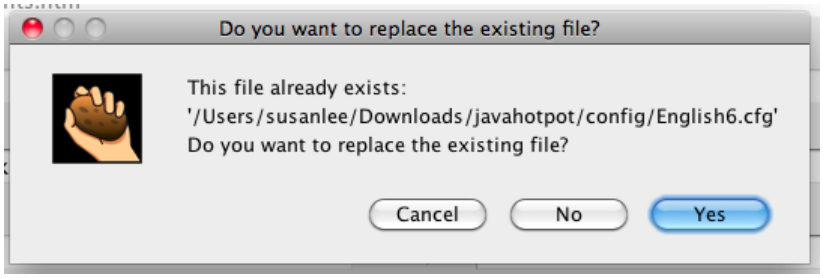


22) Next click on Buttons: Then **deselect or click** on the boxes next to "Next Exercise button, Go To Contents button, and Back button" so that there are no check marks in these boxes.

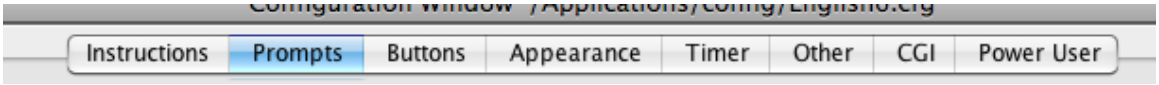


23) Then click **Save**.

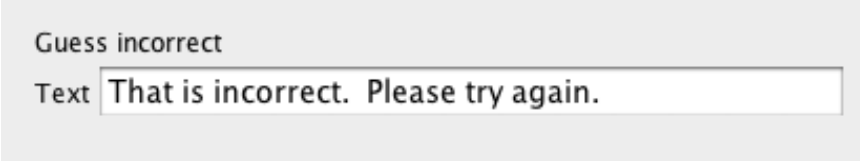
24) Then click "**Yes**" (see below)



25) Then click on **Prompts.**



26) Then type in "**That is incorrect. Please try again**." For the **Guess incorrect text box.**

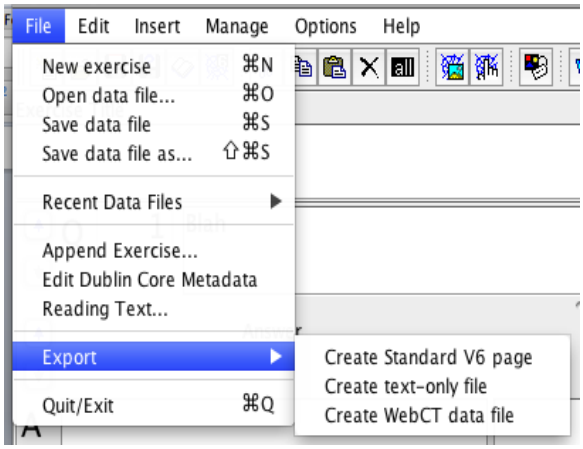


27) Next click **Save**.

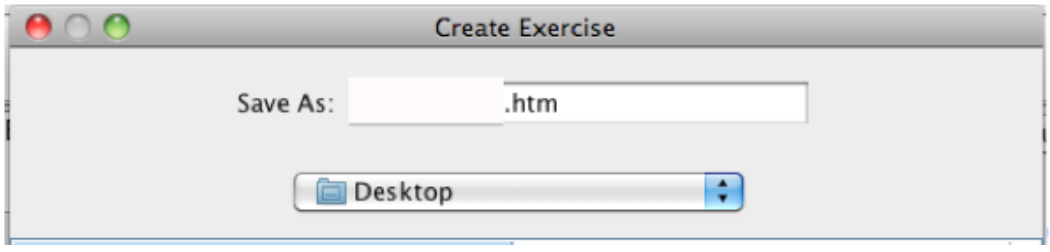
28) Click **Yes**.

29) Then click **Close** at the bottom of your screen.

30) Click on **File** and select **Export -- Create Standard V6 page** (see below).



31) Make sure to save to your desktop!! Then type in your name's (see example below). Please do NOT use any spaces.***Make sure you type a period "." and "htm" after your names. For example .htm



32) Click on the blue "**Save**" button.

33) Finally click on **View in Browser**.

34) Have another group take the quiz.

APPENDIX D

QUESTIONNAIRE ON STUDENTS' OPINIONS ABOUT PBL

1) Would you rather do a project such as the preposition project or study a list of prepositions? Circle one answer.
   a) I would rather do a project.
   b) I would rather study a list of prepositions.
   c) I would like to both projects and study a list of prepositions.

2) What stage did you like the best? Circle one answer.
   a) I liked creating the questions for the test.
   b) I liked adding the questions into Hot Potatoes.
   c) I liked taking the practice quizzes.

3) Did you like the preposition project? Circle one answer.
   a) Yes
   b) No
   c) A little

4) Would you like to do another project in the future? Circle one answer.
   a) Yes
   b) No

5) What did you like about the preposition project?

6) What did you not like about the preposition project?

7) Did you study the list of prepositions?
   a) yes
   b) no

8) If you did study the list of prepositions, how many minutes or hours did you study them?

_____

9) How did you study the list of prepositions? Did you try to make rules or just memorize them?

_____

APPENDIX E

TESTS

Pretest Over Prepositions

Directions: Circle the correct preposition.

1. She lives_____ the second floor.
   a) with b) in c) for d) on

2. He has sailed _____ a ship three times.
   a) at b) on c) of d) up

3. I need one cup _____ milk.
   a) of b) at c) on d) in

4. He took some money, and now he's _____ prison.
   a) in b) about c) of d) with

5. She's anxious _____ taking the test.
   a) on b) with c) about d) in

6. People kept bumping _____ me when I was at the store.
   a) with b) at c) on d) into

7. He likes to think _____ his future and how he can improve his life.
   a) off b) about c) in d) with

8. She is excellent _____ reading.
   a) for b) at c) on d) of

Directions: Write in the correct preposition.

9. He is incapable _____ telling a lie.

10. She was hungry _____ pizza.

11. For my paper, I quoted _____ a history book.

12. We were grateful _____ the teacher's help.

13. I'm preparing _____ winter. I just bought a coat.

14. I have two sisters whom I can depend _____.

15. Today I will focus _____ teaching my son how to drive.

16. They were dissatisfied _____ the food at the restaurant.

Posttest Over Prepositions

Directions: Circle the correct preposition.

1. Mary is excellent _____ making friends.
   a) of b) on c) at a) for

2. Susan enjoys thinking _____ what she is going to do during vacation.
   a) with b) in c) about d) at

3. Kim has never bumped _____ another car when parking.
   a) into b) on c) at d) with

4. What are you anxious _____?
   a) in b) about c) with d) on

5. Why is she _____ prison?
   a) with b) of c) about d) in

6. To make this cake, you need a cup _____ sugar.
   a) in b) on c) at d) of

7. The child has never sailed _____ a ship before.
   a) up b) of c) on d) at

8. His office is _____ the fifth floor.
   a) on b) for c) in d) with

Directions: Write in the correct preposition.

9. Focus _____ finding the mistakes in the paper.

10. Michael was dissatisfied _____ the book that he bought at the store.

11. Jim is depending _____ his friends to help him find a girlfriend.

12. Jennifer is preparing _____ the test by studying her notes from class.

13. I am very grateful _____ my parent's support.

14. John quoted _____ a famous science book.

15. Sam was hungry _____ hotdogs.

16. The woman is incapable _____ carrying heavy things.

Delayed Posttest Over Prepositions

Directions: Circle the correct preposition.

1. My sister bumped _____ the wall while walking in the house at night.
   a) on b) into c) with d) at

2. It is good for women to drink nine cups _____ water a day.
   a) on b) in c) of d) at

3. The man sailed around the world _____ a ship.
   a) on b) at c) up d) of

4. Martha was excellent _____ running when she was young.
   a) of b) for c) on d) at

5. Which floor is your apartment _____?
   a) for b) on c) in d) with

6. Sam was thinking _____ how busy he was when his boss called him.
   a) in b) with c) off d) about

7. They are _____ prison now.
   a) about b) of c) in d) with

8. Mary is anxious _____ going to the doctor.
   a) with b) on c) in d) about

Directions: Write in the correct preposition.

9. Sally is preparing _____ the party.

10. Jennifer is dissatisfied _____ the service she received at the bank.

11. Sam quoted _____ a business report.

12. I'm having trouble focusing _____ writing my paper.

13. The man is incapable _____ driving.

14. You can depend _____ me when you are in trouble.

15. Are you hungry _____ an apple?

16. Jim was grateful _____ the present that his friend gave him.

APPENDIX F

DEMOGRAPHICS SURVEY

1) First name _____
2) Last name (family name) _____
3) How old are you? _____
4) What country are you from? _____
5) What English class are you taking now? For example: IEOP, 99L, 101B, DMACC level 3 class, or MEXT program _____
6) How long have you lived in the United States? _____
7) How long have you studied English?

   _____

8) Complete the sentence. I have studied prepositions for (how long)

   _____.

9) What is your highest diploma or degree earned?

   _____

APPENDIX G

LIST OF 16 PREPOSITIONS TO STUDY

1) grateful for
2) in (a car)
3) in (a taxi)
4) in the morning
5) in the evening
6) look for
7) on (the floor)
8) on (the phone)
9) on (the table)
10) on (TV)
11) ponder about
12) prepare for
13) search for
14) study for
15) thankful for
16) think about

APPENDIX H

HOW TO CREATE MULTIPLE-CHOICE QUESTIONS

Words that are about **communicating** or **talking** and use the preposition **"WITH":**

[communicate **With** -- talk **With**]

I communicated **with** him about the research project.

She talked **with** Ben today, and he said he could give her a ride to school.

Create two multiple-choice questions using communicate **With and** talk **With.**

FOR EXAMPLE: (Please underline the answer!)

1) Did you communicate _____ her about the job?

a) of b) with c) in d) at

2) Who are you talking _____ ?

a) of b) at c) with d) of

APPENDIX I

SUMMARY OF DATA

Student #	1	2	3	4	5	6	7
Level	Inter	High	High	Inter	High	High	Low
Studied English (Years)	1	2	12	9	2	17 months	1
Preference L, P, or Both	Project	Project	Both	Project	List	Both	List
Minutes they studied the list	10	10	15	15	5	20	20
How they studied the list	copy	memorized	memorized	copy	read	memorized	found sentences
		found sentences		memorized	say out loud	found sentences	on Internet
		on Internet		take notes		on Internet	dictionary
				say out loud		made rules	
				made rules			
Which stage did you like?	3	1	3	1	2	1	3
PROJECT							
Pretest	25%	58%	58%	25%	75%	67%	42%
Posttest	42%	83%	67%	50%	92%	100%	33%
Delayed Posttest	42%	83%	75%	42%	100%	75%	25%
LIST							
Pretest	25%	100%	75%	50%	100%	100%	75%
Posttest	25%	100%	100%	100%	100%	100%	0%
Delayed Posttest	50%	100%	75%	50%	100%	100%	25%

Student #	1	2	3	4	5	6	7
STAGE ONE							
Pretest	0%	50%	25%	25%	100%	75%	25%
Posttest	0%	100%	25%	75%	100%	100%	25%
Delayed Posttest	25%	100%	100%	25%	100%	100%	50%
STAGE TWO							
Pretest	50%	50%	75%	0%	50%	75%	50%
Posttest	50%	50%	75%	25%	75%	100%	75%
Delayed Posttest	50%	50%	50%	25%	100%	75%	25%
STAGE THREE							
Pretest	25%	75%	75%	50%	75%	50%	50%
Posttest	75%	100%	100%	50%	100%	100%	0%
Delayed Posttest	50%	100%	75%	75%	100%	50%	0%
Nationality	Mexico	Indonesia	Uzbekistan	Oman	Turkey	S. Korea	China
Age	33	30	46	39	27	43	----------
Gender	Female	Male	Female	Male	Female	Male	Female
Education (years)	12	18	18	12	18	16	12

Student #	8	9	10	12	13	14	15
Level	High	Low	Low	Inter	Low	Low	Low
Studied English (Years)	15	2 months	6 months	4	5	2	2
Preference L, P, or Both	Project	Both	-------	Both	List	Project	List
Minutes they studied the list	15	30 - 60	-------	60	20	45	10

Student #	8	9	10	12	13	14	15
How they studied the list	read	read / copy	-------	made sentences	read	memorized	read
	tried to make	tried to make rules		looked up words	create a story	example sentences	found sentences
	rules with a book	found sentences		in the dictionary	dictionary	made rules	on Internet
		on Internet		made rules		dictionary	dictionary
		dictionary		highlighted in red			
Which stage did you like?	3	1	-------	3	1	3	2
PROJECT							
Pretest	75%	50%	50%	50%	25%	33%	33%
Posttest	83%	75%	42%	75%	33%	50%	42%
Delayed Posttest	75%	67%	50%	50%	25%	25%	17%
LIST							
Pretest	50%	75%	100%	50%	25%	75%	50%
Posttest	100%	100%	100%	75%	50%	75%	100%
Delayed Posttest	100%	75%	50%	75%	75%	75%	25%
STAGE ONE							
Pretest	50%	50%	50%	25%	0%	50%	25%
Posttest	50%	75%	50%	50%	0%	50%	25%
Delayed Posttest	50%	100%	25%	50%	0%	25%	0%

Student #	8	9	10	12	13	14	15
STAGE TWO							
Pretest	100%	75%	50%	50%	50%	25%	75%
Posttest	100%	50%	50%	75%	75%	50%	75%
Delayed Posttest	100%	50%	50%	50%	75%	25%	25%
STAGE THREE							
Pretest	75%	25%	50%	75%	25%	25%	0%
Posttest	100%	100%	25%	100%	25%	50%	25%
Delayed Posttest	75%	50%	75%	50%	0%	25%	25%
Nationality	Columbia	China	Iran	Iran	China	Peru	Taiwan
Age	26	----------	52	----------	24	51	----------
Gender	Female	Female	Male	Female	Female	Male	Female
Education (years)	16	16	14	16	16	12	14